STATE OF MISSISSIPPI

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GOVERNOR

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

GARY C. RIKARD, EXECUTIVE DIRECTOR

September 4, 2014

Ms. Beverly H. Banister, Director
Air, Pesticides and Toxics Management Division
U.S. EPA, Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street
Atlanta, GA 30303-8960

Dear Ms. Banister:

Mississippi Silicon LLC (MS Silicon) submitted an application dated August 15, 2013, for a Prevention of Significant Deterioration (PSD) permit to construct a new silicon manufacturing facility to be located near Burnsville, Mississippi in Tishomingo County. The proposed silicon manufacturing facility would utilize two (2) semi-enclosed submerged arc furnaces to produce 98-99% pure silicon metal. The public comment period for the proposed project began on October 24, 2013 and closed on November 22, 2013. On November 27, 2013, the Mississippi Environmental Quality Permit Board issued a Prevention of Significant Deterioration (PSD) permit to construct air emission equipment to MS Silicon LLC, granting permission to construct air emissions equipment to comply with federally enforceable emission limitations, monitoring requirements and other conditions set forth in the construction permit.

In a letter dated July 16, 2014, the Region 4 office of the U.S. Environmental Protection Agency provided additional comments regarding the air quality analysis for the proposed project to construct and operate a new silicon manufacturing facility. Following are MDEQ's response to EPA Region 4 comments. For clarity, EPA Region 4's comments are restated in bold type and are followed by MDEQ's response in italics.

1. **Exclusion of Fugitive and Volume Emission Sources**

According to the November 22, 2013, "Addendum #2 Updated Air Quality Impact Evaluation (Criteria Air Pollutants)," MS Silicon eliminated fugitive emission and volume source emissions because it concluded that their maximum impacts will be close to or within the facilities property boundary. To allow assessment of the appropriateness of this elimination, please provide supporting quantitative information on the number, location, and magnitude of the emissions excluded from the cumulative air quality assessment (e.g., inventory of the eliminated fugitive and volume sources).

MDEQ Response: *All emission units included in the modeling analysis were documented in Table 2-1, Emission Inventory, of Addendum #2, dated November 22, 2013. Table 2-1 lists the identifiers (point source, volume source, area source, etc...) assigned to these sources, stack parameters, and the emission rates used in the model. Fugitive sources such as haul roads, storage piles, and material handling operations were identified and included in the modeling analysis. Source emissions were calculated using best available data or estimating techniques. These calculations are provided in Table 2-3 thru Table 2-7, Potential Emissions of Regulated Air Pollutants.*

2. **Use of Actual Emissions**

The MS Silicon modeling used allowable emissions except for the modeling relating to compliance with the one hour sulfur dioxide (SO_2) National Ambient Air Quality Standards (NAAQS) and the one hour nitrogen dioxide (NO_2) NAAQS in the November 2013 Addendum #2, where actual emissions were used. The use of actual emissions in the cumulative NAAQS compliance modeling is not supported by past or current practice nor by 40 CFR Part 51, Appendix W. Please provide a detailed technical explanation why this modelling approach is appropriate and in accordance with the current regulations, guidance, and accepted practice.

MDEQ Response: *In the NAAQS analysis, the potential emissions from all emission units at the proposed MS Silicon facility were combined with the emissions of all nearby sources that had significant impacts within the proposed source's impact area and were modeled using the AMS/EPA Regulatory Model (AERMOD) version 12345 to compute the cumulative impacts from* SO_2 *and* NO_2*. The* SO_2 *and* NO_2 *air emission inventories for nearby sources were obtained from MDEQ, the Alabama Department of Environmental Management (ADEM) and the Tennessee Department of Environment and Conservation. The resulting model calculated concentrations, added to the representative background level for each pollutant, were assessed against the applicable NAAQS. Background concentrations for inclusion in the NAAQS analysis were provided by MDEQ. The initial NAAQS analysis was performed using maximum (federally enforceable) allowable emission rates or potential to emit. The initial* SO_2 *and* NO_2 *NAAQS compliance demonstration resulted in predicted concentrations that were in excess of the 1-hour NAAQS for* SO_2 *and* NO_2*.*

Further evaluation performed by MS Silicon revealed that the predicted concentrations exceeding the SO_2 *and* NO_2 *NAAQS were caused by two sources that were determined to be the primary contributors to the predicted concentrations that were above the 1-hour NAAQS.*

Listed below are the names of the two existing facilities that have emissions sources that were determined by EPA's AERMOD dispersion model to result in concentrations above the 1-hour SO_2 *and* NO_2 *NAAQS based on their allowable emission rates.*

- *Columbia Gulf Transmission located in Alcorn County, Mississippi approximately 19 kilometers northeast of the MS Silicon facility site; and*

- *TVA Colbert located in Colbert County, Alabama approximately 44 kilometers east south east of the MS Silicon facility site.*

Per review of the Memorandum, "Use of Allowable Emissions for National Ambient Air Quality Standards (NAAQS) Impact Analysis Under the Requirements for Prevention of Significant Deterioration (PSD)", dated March 16, 1989, from John Calcagni; if the NAAQS analysis revealed modeled exceedances, adjustments to the allowable emission rate could be made (use actual emissions) if it can be satisfactorily demonstrated that historical operating levels and/or operating factors will be representative of future conditions.

In addition, the US EPA memorandum "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2, National Ambient Air Quality Standard" states:

> *Concentration gradients associated with a particular source will generally be largest between the source location and the distance to the maximum ground-level concentrations from the source. Beyond the maximum impact distance, concentration gradients will generally be much smaller and more spatially uniform. A general "rule of thumb" for estimating the distance to maximum 1-hour impact and the region of significant concentration gradients that may apply in relatively flat terrain is approximately 10 times the source release height. For example, the maximum impact area and region of significant concentration gradients associated with a 100 meter stack in flat terrain would be approximately 1,000 meters downwind of the source, with some variation depending on the source characteristics affecting plume rise. However, the potential influence of terrain on maximum 1-hour pollutant impacts may also significantly affect the location and magnitude of concentration gradients associated with a particular source. Even accounting for some terrain influences on the location and gradients of maximum 1-hour concentrations, these considerations suggest that the emphasis on determining which nearby sources to include in the modeling analysis should focus on the area within about 10 kilometers of the project location in most cases. The routine inclusion of all sources within 50 kilometers of the project location, the nominal distance for which AERMOD is applicable, is likely to produce an overly conservative result in most cases.*

The guidance further states:

> *EPA's Guideline on Air Quality Models provides recommendations regarding air quality modeling techniques that should be applied in the preparation or review of PSD permit applications and serves as a "common measure of acceptable technical analysis when supported by sound scientific judgment." 40 CFR Part 51, Appendix W, section 1.0.a. While the guidance establishes principles that may be controlling in certain circumstances, the guidelines are not a strict modeling cookbook, so that, as the guideline notes, "case-by case analysis and judgment are frequently required. "Section1.0.c., in particular, with respect to emissions input data, Section 8.0a., of Appendix W establishes the general principle that "the most appropriate data available should always be selected or use in modeling analysis," and emphasizes the importance of "the exercise of professional judgment by the appropriate*

reviewing authority" in determining which nearby sources should be included in the model emission inventory. Section 8.2.3.b.

It should be noted that the closest competing source is slightly less than 13 kilometers from the proposed facility. The tallest stack for competing sources is 183 meters. Within the reasoning of the EPA guidance memorandum, the project could have been evaluated using monitored background data in conjunction with the modeled project emissions. At most, the competing sources included within the model would be considered "other sources" as defined in Appendix W.

TABLE 8–1.—MODEL EMISSION INPUT DATA FOR POINT SOURCES of Appendix W defines the operating factor for the short term modeling of "other sources" to be the annual level when actually operating, averaged over the most recent two years. This operating factor is to be combined with the maximum allowable emission limit considering continuous operation. The actual emissions are, arguably, a more accurate representation of the Appendix W requirement than the potential emissions for "other sources." Given the inclusion of a conservative background coupled with the inclusion of all competing sources from the inventory, the applicant has presented a conservative estimate of the impact on air quality surrounding the facility.

The competing sources could have justifiably been excluded from the modeling analysis. The inclusion of the competing sources at actual emission levels provide a conservative estimate of the future air quality and are protective of the NAAQS.

3. Modeled Receptor Grid

Please confirm that all modeled controlling concentrations and/or concentrations exceeding ambient standards, and concentrations challenging these concentrations (e.g., greater than 90% of the values), have been modeled with 100-meter grid resolution. If this was not the case, please provide information showing the actual grid resolution and explain why this grid resolution is appropriate. Also, please provide and explanation of why the 100-meter grid resolution was not used and discuss any potential differences in outcome from the use of a different grid.

MDEQ Response: *Maximum impacts from the proposed facility were defined within 100-meter spacing. The increase in ambient air quality due to the project was below 90% of the SIL.*

Also, Section 7.2.2., of the "Guideline on Air Quality Models" addresses critical receptor sites and states:

Receptor sites for refined modeling should be utilized in sufficient detail to estimate the highest concentrations and possible violations of a NAAQS or a PSD increment. In designing a receptor network, the emphasis should be placed on a receptor resolution and location, not total number of receptors. The selection of receptors sites should be a case-by-case *determination taking into consideration the topography, the climatology, monitor sites, and the results of the initial screening procedure.*

This section makes no mention of a defined receptor grid spacing or concentrations challenging the controlling concentrations. The receptor grid used defined the maximum impacts from the project within 100-meter spacing, which is of sufficient detail to estimate the highest concentrations caused by the project and possible violations of a NAAQS or PSD increment.

4. Plant roads, material handling and storage

Best management practices (BMP) are indicated as the methods for controlling emissions from bulldozing storage areas, vehicle road traffic, vehicle transport of raw product, and wind erosion from coal/wood/quartz/slag storage. Please provide a detailed technical justification for the selection of these unusually high control efficiencies for the BMPs which includes an explanation of how the control efficiencies will be reached.

MDEQ Response: *BMP for the various fugitive type emission sources associated with the MS Silicon facility will utilize various practices including a) inclusion of 3-sided windscreen barriers (where technical feasible), b) use of chemical stabilization and/or watering to reduce visible emissions and the development of a fugitive dust control plan to minimize PM emissions. The fugitive dust control plan is to include such control techniques as controlling with water, dust suppressants, wind screens, vehicle speed reduction and vacuuming or sweeping of facility roads, as required. The control efficiency/technology information provided by MS Silicon was based on available guidance on what levels of control (and control efficiencies) can be reasonably anticipated certain types of emission units and pollutants. This type of information was obtained from federal guidance documents, published literature, permitting agencies, as well as information and analysis discussed in technical reports such as the Western Regional Air Partnership (WRAP) Fugitive Dust Handbook* ***(http://wrapair.org/forums/dejf/fdh/content/FDHandbook_Rev_06.pdf)****. The WRAP Fugitive Dust Handbook addressed:*

- *Factors affecting fugitive dust emissions*
- *The estimation of uncontrolled fugitive dust emissions*
- *Emission reductions achieved by control techniques for fugitive source categories such as the mineral products industry, materials handling operations, paved/unpaved haul roads, and material storage piles; and*
- *Incorporates available information from both the public (federal, state, and local air quality agencies) and private sectors that address options to reduce fugitive dust emissions.*

The methods for estimation of dust emissions rely primarily on EPA's AP-42 with references to alternative methods adopted by state and local control agencies. A list of fugitive dust control measures that have been implemented by jurisdictions designated by the U.S. EPA as nonattainment for federal PM_{10} standards are presented in the table below:

Source Category	*Control Measure*	*Published PM_{10} Control Efficiency*
Material Handling	*Implement wet suppression*	*50 – 90%*
	3-sided enclosure around storage piles	*75%*
	Covered storage pile with a tarp during high winds	*90%*
Paved Roads	*Sweeping*	*4 – 26%*
	Minimize trackout	*40 – 80%*
	Remove deposits from road as soon as permitted	*>90%*
Unpaved Roads	*Limit vehicle speed to 25 mph*	*44%*
	Apply water	*10 – 74%*
	Apply dust suppressant	*84%*
	Pave surface	*>90%*
Mineral Products Industry	*Cyclone*	*68 – 79%*
	Wet Scrubber	*78 – 98%*
	Fabric Filter	*99 – 99.8%*
	Electrostatic Precipitator	*90 – 99.5%*
Wind Erosion (agricultural, open area, and storage piles)	*Plant trees or shrubs as a wind break*	*25%*
	Create cross-wind ridges	*24 – 93%*
	Erect artificial wind barriers	*4 – 88%*
	Apply dust suppressant or gravel	*84%*
	Revegetate; apply cover crop	*90%*
	Watering	*90%*

5. $PM_{2.5}$ Impact Analysis

Please provide the technical basis for the assumption that the baghouse will capture a majority of the secondary $PM_{2.5}$ emissions (i.e., nitrates and sulfates). Please note that guidance for this evaluation is the "Guidance for $PM_{2.5}$ Permit Modeling," proposed in 2013 and finalized in 2014.

MDEQ Response: *MS Silicon reviewed the Memorandum, "Guidance for $PM_{2.5}$ Permit Modeling", dated May 20, 2014, from Stephen D. Page. The memorandum discusses guidance on demonstrating compliance with the fine $PM_{2.5}$ NAAQS and PSD increment with regards to consideration of the secondary formed component of $PM_{2.5}$. $PM_{2.5}$ compliance demonstration would be required for direct $PM_{2.5}$ emissions based on dispersion modeling and MS Silicon would have to account for impacts of NOx and SO_2 precursor emissions. As discussed in Section IV of* *that memorandum a cumulative impact analysis for $PM_{2.5}$ NAAQS compliance should include the following components:*

- *Proposed new or modifying source*
    - *Primary impacts on $PM_{2.5}$, i.e., form direct $PM_{2.5}$ emissions*
    - *Secondary impacts on $PM_{2.5}$, i.e., form precursor (NO_x and/or SO_2) emissions and;*
    - *Based on information compiled by USEPA, sulfates are typically associated with industrial combustion and power generation and nitrates are associated with cars, trucks, industrial combustion, and power generation*
- *Nearby sources*
    - *Primary impacts on $PM_{2.5}$ as appropriate*
- *Monitored background of $PM_{2.5}$ that accounts for secondary $PM_{2.5}$ impacts from regional transport, secondary $PM_{2.5}$ impacts from nearby sources, and primary $PM_{2.5}$ impacts from background sources not included in the modeling inventory.*

Provided below is additional information assembled by MS Silicon to further support the $PM_{2.5}$ NAAQS cumulative analysis, taking into account theoretical $PM_{2.5}$ secondary formation. The additional information assembled regarding secondary $PM_{2.5}$ formation by MS Silicon follows the Appendix C example provided by USEPA in the May 20th, 2014 technical memorandum.

1. ***Background $PM_{2.5}$ Monitored Data** – A background $PM_{2.5}$ monitor is located in Grenada County and has been determined to be representative of the air quality in the vicinity of the MS Silicon manufacturing facility (Tishomingo County). Both counties are rural in nature, have very similar population densities (i.e., based on the 2010 census around 20,000 individuals), cover about the same overall square miles, and have light to moderate industry. The Grenada monitor has been collecting $PM_{2.5}$ measured concentrations following EPA/State monitoring requirements, procedures and quality control requirements for several years. This monitor based on its location and similar regional industrial background should be measuring ambient $PM_{2.5}$ concentration that should be very similar to that found in the area surrounding the MS Silicon facility site. The $PM_{2.5}$ data collected by this monitor should also be measuring direct and secondary $PM_{2.5}$ sources either located in the county or through regional transport. The 2012 design value concentrations obtained from this monitor were 9.5 ug/m^3 for an annual averaging period and for the 24-hour averaging period the concentration measured was 19 ug/m^3.*

    The MDEQ maintains a $PM_{2.5}$ ambient monitoring network throughout the state of Mississippi. Figures 2-8a and 2-8b (which were provided in Addendum #2) present the 2012 annual average and 24-hour average design values for $PM_{2.5}$ expressed in *ug/m3, respectively for each monitoring site located throughout Mississippi. Information that can be extracted from these figures is as follows:*

- *$PM_{2.5}$ annual average design concentrations range from 9.5 ug/m^3 to 11.6 ug/m^3 across the entire state of Mississippi. These concentrations reflect measured $PM_{2.5}$ values in rural and urban areas; and*

- *$PM_{2.5}$ 24-hour average design concentrations range from 18 ug/m^3 to 22 ug/m^3 across the entire state of Mississippi. These concentrations reflect measured $PM_{2.5}$ concentrations in rural and urban areas.*

Since these measured concentrations reflect rural and urban areas and are located throughout the entire state, any secondary $PM_{2.5}$ impacts from large industrial sources, power generation plants and mobile sources are reflected in these measured concentrations. Based on this data it would suggest that the maximum amount of measured $PM_{2.5}$ concentrations that could theoretically occur from secondary $PM_{2.5}$ sources located throughout the entire state of Mississippi would be approximately 2 ug/m^3 for an annual averaging period and 4 ug/m^3 for a 24-hour averaging period.

A review of the $PM_{2.5}$ ambient concentration data collected in northwest Alabama at the Muscle Shoals monitor located in Colbert County for the period 2008-2010 revealed a 24-hour design concentration of 22 ug/m^3 and an annual average design concentration of 10.3 ug/m^3. These concentrations fall within the ranges measured throughout the state of Mississippi. $PM_{2.5}$ data for the state of Tennessee was not as extensive as that of Mississippi and Alabama, however, the $PM_{2.5}$ monitor located in Hamilton County, which is reflective of a large urbanized area showed a $PM_{2.5}$ 24-hour average concentration range of 17 ug/m^3 to 22 ug/m^3 and annual average concentration range of 9.9 ug/m^3 to 10.1 ug/m^3, again very similar $PM_{2.5}$ ambient concentration levels to those being measured in Mississippi and Alabama.

A closer comparison of the $PM_{2.5}$ data measured at the Grenada County, Mississippi monitor and Hinds County, Mississippi monitor show a difference of 2 ug/m^3 for a 24-hour averaging period and 1.5 ug/m^3 for the annual averaging period. The total emissions (primary combustion sources) of NO_x expressed in short tons for calendar year 2011 were approximately 1200 tons (daily average of 3.3 tons/day) in Grenada County and 9000 tons (daily average of 24.7 tons/day) in Hinds County. If we make a conservative assumption and assume the difference in tons of NO_x caused the difference in the measured $PM_{2.5}$ concentration at the Grenada monitor to the Hinds monitor to increase by 2 ug/m^3 (i.e., caused by secondary $PM_{2.5}$ formation) an emission factor can be derived which could represent secondary formation. Thus it takes approximately 21.4 tons/day of NOx emissions to cause a 2 ug/m^3 change in $PM_{2.5}$ emission over a 24-hour averaging period. Since the MS Silicon facility is permitted to release approximately 2, 000 tons/year (which is approximately 505 tons/day) of NO_x emissions, the theoretical conversion of these emissions to $PM_{2.5}$, *would be approximately 0.5 ug/m^3 over a 24-hour average period, which is insignificant.*

Another example is that the $PM_{2.5}$ measured concentrations across Mississippi and Alabama do not seem to show that $PM_{2.5}$ emissions from secondary formation result in hot spot $PM_{2.5}$ impacts. What is meant by that statement is that if secondary $PM_{2.5}$ formation was a significant contributor to $PM_{2.5}$ air quality, ambient monitors would show a larger difference or variation in $PM_{2.5}$ impacts from rural to urban locations and in the vicinity of large power generation plants. The data shows consistency throughout the region with small variations in concentrations for both the 24-hour and annual concentrations. For example the TVA Colbert power plant is located in Colbert County, Alabama. This plant has actual emission of approximately 13,000 tons/year of SO_2 (average over 2012 and 2013) and approximately 6,700 tons/year of NO_x (average over 2012 and 2013). The monitoring network established in Alabama shows minimal variation across the entire state and the monitors located downwind of the TVA Colbert plant show no significant change in $PM_{2.5}$ concentrations from that shown within the region.

Consequently from the above two examples it can be concluded that potential emissions of SO_2 and NO_x from the MS Silicon facility which are significantly less than that associated with sources located in Hinds County, Mississippi, as well as that of the TVA Colbert power plant (less than 15% of the total actual emissions of NO_x and 30% of the actual emissions of NO_x emitted by the TVA Colbert plant) should have minimal effect on $PM_{2.5}$ impacts from secondary $PM_{2.5}$ formation.

2. ***Modeled Primary $PM_{2.5}$ Impacts from MS Silicon Facility*** *– Modeled primary $PM_{2.5}$ impacts form the MS Silicon facility using worst case operating condition and using a conservative "first Tier" approach, which involves combining modeled primary $PM_{2.5}$ impacts with a monitored background $PM_{2.5}$ concentrations were below the 24-hour and annual $PM_{2.5}$ NAAQS. Modeled maximum 24-hour and annual average concentrations from the facility based on operation of two (2) submerged arc furnaces and supporting operations are approximately 5 ug/m^3 and 1.0 ug/m^3, respectively. These concentrations represent less than 15% and less than 10% of the corresponding $PM_{2.5}$ NAAQS, respectively. Combining these predicted concentrations with a representative background concentration results in a $PM_{2.5}$ 24-hour average concentration of approximately 24 ug/m^3 which is roughly 69% of the 24-hour $PM_{2.5}$ NAAQS, and for the annual average concentration, the combined impact would be 10.5 ug/m^3 which is approximately 88% of the annual $PM_{2.5}$ NAAQS.*

3. ***Secondary $PM_{2.5}$ impacts associated with the MS Silicon facility.*** *As shown in item 2 above predicted concentrations from emissions of direct $PM_{2.5}$ when combined with a representative $PM_{2.5}$ background concentration are below the $PM_{2.5}$ 24-hour and annual average NAAQS concentrations. In the event emissions of SO_2 and NO_2 released from the MS Silicon facility would chemically react to form secondary $PM_{2.5}$,*

this would occur over time and distance and the points of maximum $PM_{2.5}$ impact from secondary formation would be different than the impacts from direct $PM_{2.5}$ emissions. As a result, it is highly unlikely that the maximum concentrations discussed in item 2 above would actually increase. The resultant concentration from secondary PM2.5 formation would most likely be less than that stated in item 2.

4. ***Secondary $PM_{2.5}$ Formation Statewide NO_x Emissions/ Large Coal Fired Power Plants.*** *As discussed in item #1 above, NO_x emissions and SO_2 emissions (potential $PM_{2.5}$ precursors) that are authorized under the permit issued by the MDEQ for the MS Silicon facility, in comparison to statewide emissions, as well as the actual emissions from the TVA Colbert coal fired power plant, are a fraction of those emission rates and actual measured $PM_{2.5}$ concentrations in Mississippi and Alabama and show minimal variation across the PM2.5 monitors in these states. Therefore, it does not appear that a significant change in $PM_{2.5}$ concentrations will occur because of secondary formation of $PM_{2.5}$ emissions from the MS Silicon facility.*

5. ***Cumulative Impact Analysis Conservative Assumption.*** *There are other conservative assumptions that have been included in the $PM_{2.5}$ cumulative impact analysis. This included operation of the plant under worst case operating conditions, including emissions from other nearby sources based on permit allowable, thus assuming they will also be operating at their worst case operating conditions, and the conservative approach when the design background concentration from a representative $PM_{2.5}$ monitor is added to the maximum modeled predicted $PM_{2.5}$ concentration. It is very unlikely that all of these worse case variables will occur at the same time and space. Thus the predicted $PM_{2.5}$ impacts form the proposed MS Silicon facility are very conservative and should have sufficient leeway to accommodate any minor change in $PM_{2.5}$ concentrations based on secondary $PM_{2.5}$ impacts.*

Based on the above factors, MS Silicon is confident that sufficient information / data has been assembled that demonstrates the silicon manufacturing facility being constructed in Burnsville, Mississippi will not cause or contribute to an exceedance of the $PM_{2.5}$ annual and 24-hour NAAQS taking into account the fact that the overall impacts of secondary $PM_{2.5}$ formation within the area of impact, as well as within the region should be minimal.

6. Two-Prong Culpability Contribution Analysis

To address the project's contribution to modeled NAAQS violations, a unique, two-prong procedure was used. The first prong consisted of modeling the project's impacts along a straight line from the project to the nearby source assumed to cause the violation. It was assumed that the maximum interaction between these sources would occur along the straight line path downwind of the other source with no consideration of real atmospheric conditions where plumes interact. The second prong, which is also addressed above in comment #2, is a cumulative NAAQS compliance assessment performed using actual emissions, rather than permit allowable emissions, for the facilities contributing most to the modeled violations. Please provide the technical basis for accepting this two-prong culpability approach used to demonstrate no significant project impact to all modeled NAAQS exceedances.

MDEQ Response: *In order to perform the SO_2 and NO_2 1-hour NAAQS compliance demonstration it is important to understand the statistical form of the NAAQS, how concentration are determined within the model "AERMOD" and how the model incorporates the five years of hourly meteorological data. AERMOD predicts 1-hour concentrations from each emission source associated with the facility on each receptor included in the analysis for each hour of the meteorological data set being utilized. The emission sources and meteorology are steady state for each hour being evaluated. Which means for each hour of the meteorological data (i.e., 8,760 hours in a non-leap year), the sources emission rate is fixed and the wind direction, wind speed, stability, temperature, etc. are also fixed or constant for that 1-hour period. As a result there will be no variation of the source emission rate or meteorological conditions during a 1-hour period.*

The statistical form of the SO_2 and NO_2 1-hour NAAQS as define by USEPA, are as follows:

- *SO_2 1-hour NAAQS – 99^{th} percentile of 1-hour daily maximum concentrations averaged over 3-years. The 99^{th} percentile correlates to the fourth (4^{th}) highest modeled predicted concentration at a given receptor point as determined by AERMOD. USEPA has stated that the 99^{th} percentile is the annual distribution of the daily maximum 1-hour concentrations averaged across the number of years being modeled.*

- *NO_2 1-hour NAAQS – 98^{th} percentile of 1-hour daily maximum concentrations averaged over 3-years. The 98^{th} percentile correlates to the eight (8^{th}) highest modeled predicted concentration at a given receptor point as determined by AERMOD. USEPA has stated that the 98^{th} percentile is the annual distribution of the daily maximum 1-hour concentrations averaged across the number of years being modeled.*

Provided below is a summary of the modeling approach that was performed by MS Silicon to demonstrate worst case emissions of SO_2 and NO_2 from the silicon manufacturing facility would not cause or contribute to a violation of the corresponding 1-hour NAAQS, which are 196 ug/m3 and 188 ug/m3, respectively.

- ***Step 1*** *– The first step was to model using AERMOD, the maximum SO_2 and NO_x emission rates from each individual emission source associated with the MS Silicon facility AERMOD was used to determine the maximum 1-hour predicted concentrations of SO_2 and NO_2 using a five year hourly meteorological data base and defined grid of receptor points. This initial evaluation included four (4) submerged arc furnaces and supporting operations. The maximum predicted 1-hour SO_2 and NO_2 concentrations are summarized in Tables 2-2 (comparison with Significant Impact Levels (SILs), 2-3 (comparison with Significant Monitoring Concentrations (SMC), 2-5 (comparison with PSD Class II increments) and 2-6 (comparison with NAAQS) of Addendum #2. The results provided in these tables demonstrate that the emissions of SO_2 and NO_x from the individual emissions sources associated with the MS Silicon facility in and by themselves would not cause or contribute to a violation of the corresponding NAAQS.*

- ***Step 2** – The second step involved determining if the emissions of SO_2 and NO_x from the sources at the MS Silicon facility would have a significant impact on SO_2 and NO_2 air quality. To determine if a significant impact occurs, the maximum predicted concentrations based on emissions of SO_2 and NO_x from the MS Silicon facility, as determined from AERMOD, were compared to the significant impact levels (SILS) established by USEPA. As shown in Table 2-2 of Addendum #2, emissions of SO_2 and NO_x from the MS Silicon facility did result in predicted concentrations above the corresponding SILs. As discussed in Section 2.8 of Addendum #2, predicted concentrations were above the corresponding SILs and the distance to which predicted concentrations from the MS Silicon facility (i.e., operation of four submerged arc furnaces and supporting operations) were shown to be above the SILs, are listed below. Predicted concentrations of SO_2 and NO_2 beyond these distances are below the corresponding SILs:*

    - *SO_2 annual average – A distance of six (6) kilometers;*
    - *NO_2 annual average – A distance of six (6) kilometers; and*
    - *SO_2 and NO_2 1-hour averages – A distance of fifty (50) kilometers for both.*

  Refer to Addendum #1, dated October 10, 2013 which provides numerous figures showing the area that was predicted to be above the SO_2 and NO_2 SILS. Provide below is a listing of those figures and there content:

    - *Figure 8a depicts the extent of the NO_2 1-hour significant impact area based on operation of four submerged arc furnaces and supporting operations;*

    - *Figure 8b depicts the extent of the NO_2 1-hour significant impact area based on operation of two submerged arc furnaces and supporting operations;*

    - *Figure 8c depicts the extent of the NO_2 annual significant impact area based on operation of four submerged arc furnaces and supporting operations;*

    - *Figure 8d depicts the extent of the NO_2 annual significant impact area based on operation of two submerged arc furnaces and supporting operations;*

    - *Figure 9a depicts the extent of the SO_2 1-hour significant impact area based on operation of four submerged arc furnaces and supporting operations;*

    - *Figure 9b depicts the extent of the SO_2 1-hour significant impact area based on operation of two submerged arc furnaces and supporting operations; and*

    - *Figure 9e depicts the extent of the SO_2 annual significant impact area based on operation of four submerged arc furnaces and supporting operations.*

Since predicted concentrations of SO_2 and NO_x emissions from the MS Silicon facility are above the SILs, a third step was performed (discussed below) which involved a cumulative (i.e., also referred to as multi-source) impact evaluation to demonstrate that the combined concentration impacts from the MS Silicon facility's SO_2 and NO_x emission sources in combination with the existing sources with the potential to emit each of these regulated air pollutants would result in combined concentrations that would be below the corresponding NAAQS.

Knowing the extent of the significant area is also important since any existing source located within that significant impact area or causing a significant impact from its emissions sources on that area must be included in the cumulative NAAQS compliance demonstration. For any predicted concentrations above the NAAQS based on modeling the MS Silicon facilities emission sources and existing sources has to be further evaluated to determine if the MS Silicon facilities emission sources would have predicted concentrations that are significant on the same hour and receptor point predicted by AERMOD which exceeds the NAAQS. Refer to Step 3 below which describes the various evaluations performed by MS Silicon to demonstrate that emissions of SO_2 and NO_x from the silicon facility would not cause or contribute to an exceedance of the 1-hour NAAQS for SO_2 and NO_2, respectively.

- ***Step 3**- The third step involved evaluating the cumulative impacts from the SO_2 and NO_x emission sources associated with the MS Silicon facility and emissions of SO_2 and NO_x from other existing sources. The inventory of existing sources with potential SO_2 and NO_x emission sources were provided by the Mississippi, Alabama and Tennessee environmental regulatory agencies. These inventories contained the required source parameters for inclusion in a NAAQS compliance demonstration, including the allowable emissions of SO_2 and NO_2. These inventories were reviewed by MS Silicon and any emission sources located within 50-km of the predicted significant impact areas for SO_2 and NO_2 were evaluated for inclusion in the multi-source impact analysis using the "North Carolina 20D Rule". The "North Carolina 20D Rule", developed by the North Carolina Department of Environment and Natural Resources (NCDENR) Air Quality Section, excluded from the emissions inventory those sources where the facility-wide emission rates in tons/year is less than 20D, where D is the distance from the nearby source to MS Silicon for short term emissions and the distance from the nearby source to the nearest boundary of the significant impact area for long term emissions. Tables 3-1, 3-2, 3-3 and 3-4 in Addendum #2 provides these inventories along with identification of which existing emission sources were excluded based on the minimal threshold of emissions and distance.*

Predicted SO_2 1-hour concentrations resulting from the cumulative impact evaluation summed with a representative background concentration are provided in Table 3-6 of Addendum #2. As shown in this table predicted concentrations obtained from AERMOD (based on permit allowable emission rates for the existing emission sources were significantly higher than the corresponding 1-hour NAAQS. A source culpability analysis *was performed and it was determined that one existing source, the TVA Colbert coal fired power plant resulted in predicted concentrations that were above the 1-hour SO_2 NAAQS based on permit allowable emissions from this plant by itself. The TVA Colbert plant is located in Colbert County, Alabama approximately 44 kilometers east south east of the MS Silicon facility site.*

Further discussions were held with representatives from the MDEQ regulatory agency and it was determined that it would be appropriate to utilize actual operating conditions for the TVA Colbert plant's emissions sources. The resulting actual emissions based on these actual operating conditions were obtained from USEPA's Acid Rain database and are significantly less than the plant's permit allowables. As shown in Table 3-4b predicted SO_2 cumulative impacts were shown to be below the SO_2 1-hour NAAQS when evaluating with AERMOD based on actual emission rates. The approach of using actual operating conditions is allowed by USEPA's guidance as defined in Appendix W of 40 CFR Part 51. It is also important to note that the location of this plant is 44 kilometers from the proposed MS Silicon facility which would result in this plant being classified as an "other emission source". Also, information available through the Tennessee Valley Authority shows emissions of SO_2 (as well as emissions of NO_x) have dropped significantly from this plant over the past several years. The reductions in SO_2 emissions are based on strategies developed by TVA Colbert to reduce its overall emissions of SO_2 from this plant with process improvements. These process improvements are not reflective in the plant's permit allowable emission rates. These reductions in SO_2 emissions which are reflective of plant operations are a significant reason for using actual emissions versus allowable emissions in the cumulative-source SO_2 impact demonstration for the TVA Colbert plant. These actual emissions better reflect the operation of the TVA Colbert plant based on improvements to the equipment's actually operating parameters.

Prior to the use of actual operating conditions for the TVA Colbert plant to demonstrate compliance as discussed above, a worst case impact analysis was also performed (referred to as the first prong of a two prong analysis). This worst case impact analysis involved predicting through the use of AERMOD the worst case 1-hour impact from the MS Silicon facilities emissions of SO_2 downwind of the TVA Colbert plant. Because we are dealing with a one hour averaging period any wind direction blowing from a direction other than the west northwest would not be influenced significantly by emissions from the MS Silicon facility (refer to figure 3-1 in Addendum #2 for the relationship between the location of the MS Silicon facility and TVA Colbert plant). Thus, if there are predicted exceedances of the 1-hour SO_2 NAAQS based on permit allowable SO_2 emission rates from the TVA Colbert plant, the only time that MS Silicon could potentially provide additional impact is when the wind is blowing from the west northwest. Consequently we have drawn a straight line from the MS Silicon facility to the TVA Colbert plant. This is the direction that would cause the maximum contribution from the MS Silicon facility downwind of the TVA Colbert plant. In order to define the maximum impact (i.e., predicted 1-hour concentrations), receptors were placed along this line downwind of TVA

Colbert plant and AERMOD was rerun on these receptors points for each of the five years of meteorological data. Refer to Table 3-6a in Addendum #2 that summarizes the SO_2 predicted concentration at each receptor point included in that analysis for each individual year evaluated. As shown in this table all predicted SO_2 1-hour concentrations based on operation of four submerged arc furnaces and supporting operations were below the corresponding 1-hour SIL. Consequently the proposed MS Silicon plant would not have a significant contribution to predicted concentrations resulting from the TVA Colbert plant when the wind was from the west northwest that would be in excess of the 1-hour SO_2 NAAQS.

Predicted NO_2 1-hour concentrations resulting from the cumulative impact evaluation summed with a representative background concentration are provided in Table 3-7a of Addendum #2. This table shows predicted 1-hour NO_2 concentrations to be several orders of magnitude above the 1-hour NO_2 NAAQS. A source culpability analysis was performed and it was determined that two existing source, the TVA Colbert coal fired power plant located in Colbert County, Alabama and the Columbia Gulf Transmission plant located in Alcorn County, Mississippi (approximately 19 kilometers to the northwest of the MS Silicon facility site) resulted in predicted concentrations that were above the 1-hour NO_2 NAAQS based on permit allowable emissions from these plants by themselves. Refer to Figure 3-1 in Addendum #2 that depicts the locations of these two plants in relationship to the MS Silicon facility.

In order to determine whether or not the MS Silicon facilities emissions of NO_x would significantly contribute to a predicted exceedance of the 1-hour NAAQS, various modeling evaluations were performed. Each evaluation performed is summarized below:

- *The first evaluation performed involved defining the maximum NO_2 contribution that the MS Silicon facility could provide downwind of Columbia Gas Transmission and TVA Colbert plants. Receptors were placed along the straight line between each source and downwind of the source. The same approach that was used for the SO_2 cumulative impact analysis discussed above was used as part of this NO_2 analysis. Table 3-7c of Addendum #2 shows that the maximum NO_2 contribution from the MS Silicon facility would be below the corresponding NO_2 1-hour SIL. However, in order to demonstrate that these predicted concentrations were below the 1-hour SIL, MS Silicon committed to operating no more than 2 of the 4 submerged arc furnaces simultaneously. This is essentially the same as cutting the potential emissions of NO_x from the facility by 50% during a 1-hour average period. Also included in this table is an adjustment factor to account for the transformation of NO_x to NO_2. Following USEPA guidance a conversion factor (Tier II) of 0.8 was employed. The predicted concentration obtained from AERMOD was multiplied by 0.8 to present the predicted NO_2 impact versus a NO_x impact concentration. As shown in table 3-7c all predicted NO_2 concentrations as contributed by MS Silicon would be below* *the NO_2 1-hour SIL, thus the facility would not cause or contribute to a predicted exceedance of the 1-hour NAAQS for any predicted exceedances that would be determined for receptors located to the northwest and southeast of the Columbia Gulf Transmission plant and TVA Colbert plant, respectively.*

- *The second evaluation to further support the fact that the MS Silicon facility will not cause or contribute to a predicted exceedance of the 1-hour NO_2 NAAQS, was to determine whether or not the Columbian Gas Transmission and TVA Colbert plants would cause a predicted exceedance of the NO_2 1-hour NAAQS if allowable emissions were replaced with emission of NO_x that were reflective of actual operating conditions. The resulting predicted NO_2 1-hour concentrations were still above the corresponding 1-hour NO_2 NAAQS.*

- *Since predicted concentrations were still shown to be above the 1-hour NO_2 NAAQS based on using actual operating conditions to define the NOx emission rates for the two facilities, additional evaluations were performed. As discussed on page 3-27 multiple modeling runs were made to determine if the MS Silicon facility would contribute to an exceedance of the NO_2 1-hour NAAQS. Again because of the wind direction and receptor point locations being fixed during a given 1-hour period, predicted concentrations resulting from other existing facilities occurred when the wind directions were not lined up between the MS Silicon facility and the existing sources. So in short, exceedance of the 1-hour NAAQS were a result of those existing source and not because of the MS Silicon facility. Because this relationship was shown to occur and remained throughout the various evaluations performed, there was no reason to evaluate every 1-hour period and receptor period that exceeded the 1-hour NO_2 NAAQS.*

  To further support the conclusion defined above, MS Silicon performed an additional analysis which involved using the MAXCOUNT option of AERMOD. The MAXCOUNT option of AERMOD allows the user to define a concentration expressed in ug/m^3 and the model will determine and summarize each receptor / hour combination that resulted in a predicted concentration at or above that defined concentration. Using the MAXCOUNT option, MS Silicon reran AERMOD with the 5-years of meteorological data on the significant impact area receptor grid (over 5,000 receptor points). The defined concentration was set at 124 ug/m^3 within the AERMOD input file. Selection of this defined concentration caused AERMOD to identify all receptor / hour combinations for the 5-year period that were above the 124 ug/m^3. This concentration was selected since the combination of this concentration and a representative background concentration of 64 ug/m^3 would when combined correlate to the 1-hour NO_2 NAAQS of 188 ug/m^3. Two source groups were utilized in AERMOD, one group that had all the sources included in the cumulative NO_2 impact analysis and a second group with only two submerged arc furnaces and supporting equipment associated with the MS Silicon facility. For each predicted concentrations above

124 ug/m^3, the contribution from the MS Silicon facility was essentially zero ug/m^3. AEROMOD actually calculated a contribution from MS Silicon however those concentrations were less than 0.01 ug/m^3 on each predicted concentration in excess of 124 ug/m^3.

Based on all of the various evaluation performed above, there is sufficient data to adequately demonstrate that the MS Silicon facilities emissions of NO_x will not cause or contribute to a violation of the 1-hour NO_2 NAAQS. Because of this data and the conclusions drawn, MS Silicon does not see the need to perform any additional NO_2 modeling as part of the cumulative impact analysis to demonstrate what affect the MS Silicon facility would have on every receptor / hour combination throughout the five year meteorological data set that resulted in predicted exceedances of the 1-hour NO_2 NAAQS. It is also import to reiterate that MS Silicon has committed to operating no more than two of the four proposed submerged arc furnaces during any one-hour period. This operational restriction causes a significant reduction in the predicted contribution of the MS Silicon facility on ambient NO_2 air quality.

7. Modeling Procedure for 1-Hour NO2

The use of actual emissions (see EPA questions 2 and 6, above) for the two significant nearby facilities reduced the number of modeled NO2 violations but MS Silicon significantly contributed to some of the remaining modeled violations. An 8-step process was used to resolve MS Silicon's contribution to the modeled NO_2 violations but only for "critical" receptors, as described in the application. This process does not address significant contribution by MS Silicon to all modeled concentrations exceeding the NAAQS. Please provide the technical basis for the conclusion that there are no significant project contributions to any modeled concentration exceeding the NAAQS.

MDEQ Response: *Refer to the response provided by MS Silicon for Question #6 above. Numerous evaluations were performed by MS Silicon and based on MS Silicon committing to operating no more than two submerged arc furnaces during any 1-hour period MS Silicon has demonstrated that no significant impact should occur from the facility on any predicted 1-hour NAAQS exceedance. This was further reinforced with the five years of modeling runs that were performed using the MAXCOUNT feature of AERMOD and evaluating receptors contained within the significant impact area. As discussed in Response #6, predicted NO_2 concentrations from the MS Silicon facility for any receptor / hour combination above a predicted concentration of 124ug/m^3 for the five year meteorological period evaluated, showed an NO_2 impact of 0.01 ug/m^3 or less on each of these receptor / hour combinations from the NO_x emission sources associated with the MS Silicon facility.*

8. Impacts to Soils and Vegetation

Given the modeled NAAQS violations for the 1-hour SO2 and NO2, the statement in Section 4.2 that the maximum predicted NO2 ambient concentrations are below the ambient air quality standards is unsupported. The results of the NAAQS compliance modeling (i.e.,

cumulative impacts) should be used for comparison to the target values in Tables 4-1. Please provide the technical basis for assessment of soils and vegetation impacts.

MDEQ Response: *The statement provided in Section 4.2 states that the proposed MS Silicon plant will have no adverse impact on vegetation and soils. This statement was supported by conducting evaluations as recommended by USEPA in its screening procedure document for determining the impact of air pollution sources on plants, soils and animals. As discussed in Section 4.2 of Addendum #2, following these procedures the resulting predicted concentrations from emissions of regulated air pollutants from the MS Silicon facility are below the NAAQS, which are intended to protect human health and welfare (i.e., soils and vegetation) and are also well below the minimum vegetation sensitivity levels presented in the guidance document prepared by USEPA. In fact, predicted concentrations from the MS Silicon plant are less than 30% of the lowest sensitivity concentration established by USEPA as listed in Table 4-1.*

As discussed in response #6 above, the cumulative impact analysis for emissions of NO_x to demonstrate compliance with the NO_2 1-hour NAAQS did show predicted NO_2 concentration above this standard. As shown in Table 3-7a of Addendum #2, the predicted NO_2 1-hour impact based on modeling emissions from the MS Silicon facility and other existing sources in the area was 1159.86 ug/m^3. This includes the contribution from the MS Silicon and existing emission sources modeled and a conservative NO_2 background concentration. As shown in Table 4-1 the vegetation sensitivity concentration at the lowest sensitive concentration is 3,760 ug/m^3 for a 4-hour period. The maximum 1-hour concentration noted above (the actual predicted 4-hour concentration would be less than this value) is well below the sensitive concentration threshold of 3,760 ug/m3. Subsequently, emissions of NO_x from the MS Silicon facility and other existing sources should not have an adverse impact to vegetation.

As shown in Table 3-6 of Addendum #2, cumulative SO_2 impacts based on using permit allowable SO_2 emission rates for the TVA Colbert power plant showed predicted concentrations including a representative background to be 1378.26 ug/m3, which is slightly above the vegetation sensitivity sensitive threshold of 917 ug/m^3 for a 1-hour period. However, as discussed above the TVA Colbert plant has taken extensive measures to reduce is SO_2 emissions from this plant. Historical actual SO_2 emissions from this plant have been decreasing significantly. Taking into account these SO_2 reduction measures, the cumulative impact analysis resulted in combined impacts of SO_2 for a 1-hour period being 137.99 ug/m3 (refer to Table 3-6b of Addendum #2). These cumulative SO_2 impacts are below the 1-hour NAAQS of 188 ug/m3 which are intended to protect human health and welfare, as well as the vegetation sensitive threshold of 917 ug/m3. As such, predicted SO_2 cumulative impacts are below vegetation impact threshold levels established by USEPA. Thus, the MS Silicon facility in combination with other existing SO_2 emission sources should not have an adverse impact to vegetation.

9. PSD Class II Visibility Assessment

The applicant did not include a visibility impairment assessment of the project's impact in the PSD Class II area (i.e., project's impact area). Please provide the technical basis for the conclusion that this analysis was not needed for this project.

MDEQ Response: *: The MS Silicon facility will be equipped with Best Available Control Technologies (BACT) for each source with the potential to generate emissions of particulate matter (PM), oxides of Nitrogen (NO_x) and sulfur dioxide (SO_2). This will include fabric baghouses on the plant's submerged arc furnaces to significantly reduce PM and where appropriate on the material handling operations, as well as the use of Best Management Practices (BMPs) to minimize the formation of PM from the facility's fugitive emission sources. Good operating practices will also be implemented to ensure that excessive NO_x and SO_2 emissions do not occur from the facility's submerged arc furnaces and other supporting combustion devices. During actual operation of the facility, MS Silicon will be required to implement and utilize a dust control plan and will take daily visual observations to ensure that these operations will not generating emissions of NO_x, SO_2 and PM that would be injurious to humans, animals, plants, nor property, or to be a public nuisance, or create a condition of air pollution.*

In addition, the PM emission sources associated with the MS Silicon plant are required to meet very strict opacity standard expressed as a percentage. This includes 3% opacity standard on the plant's submerged arc furnaces and 10% for all other PM generating sources associated with the plant.

The incorporation of BACT and the establishment of very strict PM opacity limits should result in no visibility impairment (i.e., atmospheric discoloration and visual range reduction (increased haze)) to the surrounding area. Because of strict emission requirements imposed upon the facilities operations, it was determined that conducting a Class II visibility impairment study was not necessary.

Finally, the Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. Secondary standards have been established for the 3-hour SO_2, the Annual NO_2, the 24-hour PM_{10}, and the annual and the 24-hour $PM_{2.5}$. There are no state or federal parks or airports within the significant impact area for these regulated air pollutants and averaging periods, which has historically been the determining factor for requiring a Class II visibility analysis. Since these sensitive areas were not identified to reside within the significant impact areas for these regulated air pollutants, not further Class II visibility assessment was required.

10. PSD Class I Area Significant Impact Level (SIL) Assessment

MS Silicon's PSD Class I area (Sipsey Wilderness Area) SO2 impact assessment was greater than the SIL. A cumulative impact assessment was not performed based on the applicant's statement that it was not aware of any other significant PSD increment consuming SO2 source that would impact the Sipsey Wilderness Area. The basis for this statement was not provided. Please provide the steps taken to identify other significant PSD increment consuming SO2

sources that could impact the Sipsey Wilderness Area. If sources are indeed identified, please provide a cumulative impact assessment or the technical basis for why an assessment is not needed.

MDEQ Response: *Included in Appendix C of Addendum #2 is the analysis that was performed by MS Silicon to determine the impacts of the MS Silicon facility emissions of SO_2, NO_X and PM on the Class I Sipsey Wilderness Area. As shown in Table E-1 of Appendix C, the maximum modeled SO_2 concentrations, based on using USEPA's CALPUFF model, from the MS Silicon facilities SO_2 emission sources were as follows:*

- *3-hour averaging period – High First Highest concentrations for calendar years 2001, 2002 and 2003 were 0.8775 ug/m^3, 0.5986 ug/m^3 and 1.2454 ug/m^3, respectively; and*
- *24-hour averaging period – High First Highest concentrations for calendar years 2001, 2002 and 2003 were 0.2371 ug/m^3, 0.1958 ug/m^3 and 0.2551 ug/m^3, respectively.*

Also, for consideration, the Alabama Department of Environmental Management (ADEM) has performed an assessment of the SO_2 increment impacts at the Sipsey Wilderness area. This assessment was presented at the 2010 EPA Regional/State/Local Dispersion Modelers Workshop and can be found at ***http://www.cleanairinfo.com/regionalstatelocalmodelingworkshop/archive/2010/agenda.htm***. *The analysis suggest that 57% of the 3-hour SO_2 increment, 43% of the 24-hour SO_2 increment and 0% of the annual SO_2 increment has been consumed at the Sipsey Wilderness area considering potential emissions of consuming sources ad not considering any reduction in emissions which would expand increment.*

Significant impact levels for Class 1 Areas were contained in the proposed changes to the PSD and NSR of July 23, 1996. These levels were never finalized. In the EPA memorandum, "Class I Area Significant Impact Levels", dated September 10, 1991, EPA concurred with levels proposed by the Virginia Department of Air Pollution Control. The MS Silicon modeled results are summarized below along with the proposed SILs. The modeled results were slightly over both proposed significance levels for the 3-hour averaging period. The proposed significance level is approximately 4% of the PSD Class 1 increment. Given the modeling conducted by ADEM, the addition of the impacts from the MS Silicon project will not threaten the PSD increment.

Year of Data Modeled	Averaging Period	Modeled Impact	EPA Proposed SIL July 23, 1996	EPA Concurrence of SIL, September 10, 1991
2001	3-hr	0.877	1.0	1.23
	24-hr	0.237	0.2	0.275
	Annual	0.007	0.1	0.1
2002	3-hr	0.598	1.0	1.23
	24-hr	0.196	0.2	0.275
	Annual	0.008	0.1	0.1
2003	3-hr	1.245	1.0	1.23
	24-hr	0.255	0.2	0.275
	Annual	0.010	0.1	0.1

Consequently, no adverse impact at the Class I areas are anticipated.

If you have any question or require additional information, please contact me at (601) 961-5073.

Sincerely,

Harry M. Wilson III, P.E., DEE, Chief
Environmental Permits Division
Mississippi Department of Environmental Quality

Cc: Maya Rao, Director, MDEQ/Air Division
Kathleen Lusky, USEPA/Region 4/Air, Pesticides, & Toxics/Permitting

STATE OF MISSISSIPPI
PHIL BRYANT
GOVERNOR
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
GARY C. RIKARD, EXECUTIVE DIRECTOR

March 19, 2015

Ms. Beverly Bannister
Environmental Protection Agency
Region IV
Atlanta Federal Center
61 Forsyth Street
Atlanta, GA 30303-8960

RE: Mississippi Silicon

Dear Beverly,

Enclosed please find one portable hard drive which contains an electronic copy of air modeling regarding Mississippi Silicon, LLC (MS Silicon). MDEQ, pursuant to its primary permitting authority under its EPA approved SIP, issued a Prevention of Significant Determination (PSD) Permit to MS Silicon on November 27, 2013. Since that time, in response to certain Congressional inquiries, MDEQ has worked with EPA to provide responses to the questions which have been raised.

The attached response contains modeling files developed by MDEQ under contract with an independent third party to address the questions on the air quality analysis contained in the permit application. The most appropriate data available should always be selected for use in modeling analyses. Invariably, personal professional judgment will be required in the selection of the appropriate data sets used in the modeling. The additional modeling files are included not to imply that the air quality analysis included in the application was deficient, but solely to satisfy the inquiries related to the permit. The same conclusion is drawn from this modeling as with earlier models, i.e., the project permitted emissions will not cause or contribute to an exceedance of the NAAQS or PSD increments.

In addition to the information provided on the portable hard drive, MDEQ provides the following information in response to an email dated December 12, 2014, in which the Region 4 office of the U.S. Environmental Protection Agency provided additional comments regarding

MDEQ's September 4, 2014, response to the "MS Silicon Outstanding Air Quality Impact Assessment" questions provided in your correspondence to Maya Rao, Director, Air Division, dated July 16, 2014. EPA Region 4 also commented on MDEQ's response to questions involving plant roads, material handling and storage. Following is MDEQ's response to EPA Region 4 comments. EPA Region 4's original comment is restated in bold type followed by MDEQ's response in italics.

Plant roads, material handling and storage

Best management practices (BMP) are indicated as the methods for controlling emissions from bulldozing storage areas, vehicle road traffic, vehicle transport of raw product, and wind erosion from coal/wood/quartz/slag storage. Please provide a detailed technical justification for the selection of these unusually high control efficiencies for the BMPs which includes an explanation of how the control efficiencies will be reached.

MDEQ Response: *As stated in our September 4, 2014 response, BMP for the various fugitive type emission sources associated with the MS Silicon facility will utilize various practices including a) inclusion of 3-sided windscreen barriers (where technical feasible), b) use of chemical stabilization and/or watering to reduce visible emissions and the development of a fugitive dust control plan to minimize PM emissions. The fugitive dust control plan is to include such control techniques as controlling with water, dust suppressants, wind screens, vehicle speed reduction and vacuuming or sweeping of facility roads, as required. The control efficiency/technology information provided by MS Silicon was based on available guidance on what levels of control (and control efficiencies) can be reasonably anticipated for certain types of emission units and pollutants. This type of information was obtained from federal guidance documents, published literature, permitting agencies, as well as information and analysis discussed in technical reports such as the Western Regional Air Partnership (WRAP) Fugitive Dust Handbook*

(http://wrapair.org/forums/dejf/fdh/content/FDHandbook_Rev_06.pdf). *The WRAP Fugitive Dust Handbook addressed:*

- *Factors affecting fugitive dust emissions*
- *The estimation of uncontrolled fugitive dust emissions*
- *Emission reductions achieved by control techniques for fugitive source categories such as the mineral products industry, materials handling operations, paved/unpaved haul roads, and material storage piles; and*
- *Incorporates available information from both the public (federal, state, and local air quality agencies) and private sectors that address options to reduce fugitive dust emissions.*

MISSISSIPPI DEPARTMENT OF
ENVIRONMENTAL QUALITY

MODELING REPORT

Mississippi Silicon LLC
Tishomingo County, MS

Prepared By:

FC&E Engineering, LLC
914 Marquette Road
Brandon, Mississippi 39043

FC&E Engineering, LLC
Water • Soils • Air • Compliance

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Attachment A – Surrounding Source Inventory

1.0 Facility Identification and Location

In November of 2013, the Mississippi Department of Environmental Quality issued a PSD Construction Permit to Mississippi Silicon, LLC located in Tishomingo County, MS. The facility is located approximately 2.5 miles south of Burnsville, MS east of Highway 365 as depicted in Figure 1.

Permit numbers currently registered for the facility.

Permit Number	Issue Date	Action Type
2640-00060	November 27, 2013	Air-Construction
MSR106475	November 1, 2013	GP-Construction

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2.0 Facility Description

The silicon manufacturing plant permitted to MS Silicon will be capable of producing a high quality, low cost silicon. The manufacturing plant will utilize four (4) semi-enclosed submerged arc furnaces (SAF) with a capacity of 2.75 tons/hr each (~45 MVA) to produce approximately 84,096 tons/year of 98-99% pure silicon metal. Only two arc furnaces are permitted to be operated at any given time. In particular, the modeling discussed in this report is limited to the NO_x and SO_2 emissions from the submerged arc furnaces and natural gas fired ladle preheaters.

2.1. Purpose of Modeling

The purpose of the modeling being performed for this project is to further support the response to EPA comments made to the Mississippi Department of Environmental Quality and demonstrate that the MS Silicon facility will not cause or contribute to a modeled exceedance of the National Ambient Air Quality Standard for nitrogen dioxide and sulfur dioxide. This ambient air quality modeling report has been prepared in accordance with the "Guideline on Air Quality Modeling," EPA Memos and discussions with US EPA Region 4 modeling personnel.

3.0 Model Input Options

The latest version of AERMOD (dated 14134) was used to determine compliance with the National Ambient Air Quality Standards. AERMOD is the recommended model for a wide range of regulatory applications in all types of terrain. AERMOD is appropriate for the following applications:

- Point, volume, and area sources;
- Surface, near-surface, and elevated releases;
- Rural or urban areas;
- Simple and complex terrain;
- Transport distances over which steady-state assumptions are appropriate, up to 50km;
- 1-hour to annual averaging times; and

- Continuous toxic air emissions.

The model was executed with all regulatory default options. The DFAULT option requires the use of terrain elevation data, stack-tip downwash, sequential date checking, and does not permit the use of the model in the SCREEN mode. Additionally, the most current version of the AERMOD model imposes a restriction on the urban roughness parameter to be 1 meter for regulatory default applications. In the regulatory default mode, pollutant half life or decay options are not employed, except in the case of an urban source of sulfur dioxide where a four-hour half life is applied.

As the site is located in a rural area, urban source control options were not used.

3.1. Building Downwash and Cavity Concentrations

AERMOD accounts for building wake effects (i.e., plume downwash) based on the PRIME building downwash algorithms. A building downwash analysis using the latest version of BPIP-Prime (dated 04274) was conducted and incorporated into the modeling analysis to account for potential effluent downwash due to structures using building profile input parameters included in the MS Silicon application. The layout of the buildings in relation to stacks is depicted in Figure 2.

3.2. Point Sources

Four point sources, consisting of the submerged arc furnaces, were included in the modeling to estimate the impacts of NO_2 and SO_2 surrounding the facility. These sources are summarized in Table 1. Only two arc furnaces are permitted to be operational at any given time. Impacts were determined using the four combinations of operating scenarios with each combination included in the model as a source group. The source group with the maximum ground level impacts was included in the cumulative impact modeling and the remaining combinations were discarded.

TABLE 1 - POINT SOUCE PARAMETERS

Model ID	Desc	SO_2 Emissions g/s	NO_2 Emissions g/s	Height [m]	Diam [m]	Exit_Vel [m/s]	Exit_Temp [K]
SAF1	SAF Baghouse #1	18.02	15.59	91.44	1.929	19.37	449.817
SAF2	SAF Baghouse #2	18.02	15.59	91.44	1.929	19.37	449.817
SAF3	SAF Baghouse #3	18.02	15.59	91.44	1.929	19.37	449.817
SAF4	SAF Baghouse #4	18.02	15.59	91.44	1.929	19.37	449.817

3.3. Volume Sources

Ladle preheaters were included in the model as volume sources. There is no restriction in the permit on the operation of the ladles, i.e., both ladles can be operational at a given time. Both ladles were, therefore, included in each source group scenarios previously mentioned. The volume source parameters are summarized in Table 2.

TABLE 2 - VOLUME SOURCE PARAMETERS

Model ID	Desc	SO_2 Emissions g/s	NO_2 Emissions g/s	Height [m]	SigmaY [m]	SigmaZ [m]	Length_X [m]
F1	Furnace Ladle #1	0.0015	0.2016	19.995	6.966	9.307	29.9538

F2	Furnace Ladle #2	0.0015	0.2016	19.995	6.966	9.307	29.9538

3.4. Receptor Grid

The receptor network included in the application was used in this evaluation. The following grids of receptors were used in the significant impact analysis:

Spacing (meters)	Placement
5000	20 kilometers beyond the fence line out to 50 km
2000	Between10 to 20 kilometers from the facility
1000	Between 5 to 10 kilometers from the facility
500	Between 3 to 5 kilometers from the facility
200	Between 2 to 3 kilometers from the facility
100	Out to 2 kilometers from the facility

In addition to the receptor network described above, receptors were added at 1 kilometer spacing on the eastern side of the modeling domain in the area of elevated terrain. Receptors were processed in the Universal Transverse Mercator (UTM) coordinate system with the respective spacing described above and as pictured in Figure 3. Included in the figure are National Elevation Dataset (NED) elevation contours. Elevations equal to or greater than the elevation of the MS Silicon stacks are indicated with the red hues.

Terrain elevations based on NED files were input to the AERMOD model for each receptor. The NED files were processed in the AERMAP (Version 11103) processor to develop elevations and hill heights for the receptors.

4.0 Meteorological Data

The five year dataset provided to the applicant for the years 2007 to 2011 was used to conduct the modeling. The surface data was collected from the Tupelo Regional Airport and the upper air was collected at the Jackson International Airport. The base elevation of the Tupelo Regional Airport, 104 meters, was used in the meteorology pathway of AERMOD with the PROFBASE keyword to define the base elevation for the potential temperature profile.

The met data was provided by the MDEQ in an AERMOD ready format processed with AERMET VERSION 12345 and was supplemented with one-minute ASOS data using a threshold limit of 0.50 m/s.

5.0 Significant Impact Analysis and Cumulative Impact Analysis

5.1. Significant Impact Area (SIA)

The SIA was determined by modeling the facility emission sources included in Section 3.2 and 3.3. The first-highest 1-hour value averaged over 5 years was compared to the significance levels in Table 3. The ARM factor of 0.8 was applied to the modeled NOx values prior to comparison to the NO_2 significant impact levels and ambient air standards.

The significant impact modeling is summarized in Table 4 and depicted in Figure 4 and Figure 5. The figures indicate a 50 km radius around the facility which is the limit of the AERMOD model. Impacts of both NO_2 and SO_2 exceeded the significant impact analysis, requiring a cumulative impact analysis for both pollutants. The significant impact area was considered those receptors exceeding the significance level and the next adjacent receptor. The facility is authorized to operate only two arc furnaces at any given time. Source groups were used to determine the impacts of the different combinations of the furnaces, the ladle volume sources were included in each source group. The maximum impacts for SO_2 were determined to be when SAF1 and SAF2 were operating simultaneously. NO_2 maximum impacts were identical for each source group, indicating that the maximum impacts are controlled by the ladles for the NO_2 impacts. The cumulative impact analysis was conducted using the SAF1 and SAF2 combination.

TABLE 3 - NATIONAL AMBIENT AIR QUALITY STANDARDS AND SIGNIFICANT IMPACT LEVELS.

Pollutant	Averaging Period	Significance Level (ug/m^3)	NAAQS
Nitrogen Dioxide (NO_2)	1-hour	7.52	0.100 ppm (188 ug/m^3)
Sulfur Dioxide (SO_2)	1-hour	7.86	0.075 ppm (196.5 ug/m^3)

TABLE 4 - RADIUS OF IMPACT MODELING RESULTS

Pollutant	Averaging Period	Significant Impact Level (µg/m^3)	Modeled Results (µg/m^3)	UTM X (M)	UTM Y (M)	Figure
NO_2*	1-hour	7.52	78.59706	378886.76	3851765.89	Figure 4
SO_2	1-hour	7.86	51.98635	379965.00	3852220.00	Figure 5

*Significant Impact Area and maximum NO_2 impacts determined using ARM of 0.8.

5.2. NAAQS Modeling

5.2.1. Background

The background concentrations used to determine compliance with the NAAQS in the MS Silicon application were used in this modeling analysis. SO_2 background was considered to be 70.74 ug/m^3 and NO_2 background was considered to be 63.92 ug/m^3. Background was included in the modeling runs using the BACKGRND keyword in the source option pathway with a BGflag parameter of ANNUAL.

5.2.2. Competing Source Inventory

The modeling domain extends into Tennessee and Alabama, therefore, the competing source inventory was comprised of sources from three states. The competing sources in Tennessee and Alabama included in the application were used in this evaluation. Sources in the Mississippi inventory were evaluated to determine whether they were located within the significant impact area and, if so, were included in the analysis regardless of the 20D comparison.

5.2.2.1. SO_2 Sources

Three sources located in Mississippi included in the application were excluded because they were determined to be outside of the SIA and had emissions less than 20D. These sources were Oil Dri Production Company, TVA Magnolia Combined Cycle and Tiffin Motorhomes Inc. Several minor sources were determined to be within the SIA and were, therefore, included in the cumulative analysis. The competing source modeled emissions were based on the potential emissions provided from the Mississippi inventory database. The modeled parameters are summarized in Table 5.

TVA Colbert is under a Consent Decree to shut down certain units at the facility. Unit No. 5 is to be shut down by December 31, 2015. This unit was included in the first two years of modeled data. This includes the unit for over a third of the modeled period. The basis for modeling in this fashion is the standard is a three year average and the unit could only possibly operate less than one-third of the standard averaging period simultaneously with MS Silicon. Units 1-4 are to be shut down by June 30, 2016, which is half of the standard averaging period. These units were included in the first two and a half years of the modeled period. During the third year, the variable emissions option was used to set the emissions for Units 1-4 to zero for the months July through December. Units 1-5 emissions were set to zero for the last two years of the modeled period.

TABLE 5 - SO2 COMPETING SOURCES

Facility	Model ID	Emission_Rate [g/s]	Height [m]	Diam [m]	Exit_Vel [m/s]	Exit_Temp [K]
Kingsford Manufacturing	35101	2.157083715	31.09	3.505	23.1953	1033.15
	KMC2	0.004890411	3.048	0.3048	0.001	0
Packaging Corporation of America	TN2SB1213	0.006299894	48.77	2.438	14.9657	488.706
	TN2ST1198	42.80525996	76.2	3.901	12.2225	435.928
	TN2ST6009	0.149937478	22.86	1.219	13.4722	344.261
	TN2ST6025	0.023939597	22.86	1.372	8.13816	339.261
	TN2ST7214	12.41835111	54.41	2.591	16.4592	455.372
	TN2ST7215	0.440992582	54.56	3.353	22.2809	433.15
	TN2ST7216	12.41835111	76.2	2.438	19.2024	469.261
	TN2ST7217	0.413273048	54.56	1.219	13.4112	333.15
	TN2ST7225	0.251995761	16.15	1.097	17.1907	354.261
	TN2ST7236	0.11591805	54.56	1.219	13.4112	333.15
TVA Colbert	ALMMMM	2351.624443	183.5	8.016	27.6758	424.817
	ALX001	53.928	9.693	3.871	44.2265	777.039
	ALX013	2795.640974	152.4	7.224	23.1343	417.039
	STCK1	53.928	9.693	3.871	44.2265	777.039
	STCK2	53.928	9.693	3.871	44.2265	777.039
	STCK3	53.928	9.693	3.871	44.2265	777.039
	STCK4	53.928	9.693	3.871	44.2265	777.039
	STCK5	53.928	9.693	3.871	44.2265	777.039
	STCK6	53.928	9.693	3.871	44.2265	777.039
	STCK7	53.928	9.693	3.871	44.2265	777.039
Caterpillar Inc	CAT1	0.000863014	3.048	0.3048	0.001	0
	CAT2	0.000287671	11.28	0.3048	4.572	366.48333
	CAT3	0.000575342	11.58	0.7102	12.7102	304.26111
	CAT4	0.000287671	12.5	0.3566	1.9812	366.48333
	CAT5	0.055232877	12.5	0.4054	0.9144	366.48333
	CAT6	0.018410959	12.5	0.4054	0.9144	394.26111
	CAT7	0.000575342	14.33	0.2042	5.334	366.48333
	CAT8	0.000575342	14.33	0.4572	7.10184	347.03889
Columbia Gulf Transmission	CGT1	0.002876712	3.658	0.0518	47.305	810.92778
	CGT2	0.002013699	4.572	0.2042	39.624	755.37222

Facility	Model ID	Emission_Rate [g/s]	Height [m]	Diam [m]	Exit_Vel [m/s]	Exit_Temp [K]
	CGT3	0.025890411	6.706	3.6363	15.3924	672.03889
	CGT4	0.011506849	12.19	0.6096	37.3685	810.92778
	CGT5	0.014383562	18.29	2.7523	16.4897	688.70556
Ergon Asphalt and Emulsions	ERGON1	0.48006	4.572	0.6605	4.45008	644.26111
	ERGON2	0.48006	3.658	0.3048	5.24256	644.26111
Ershigs, Inc.	ERSHING	0.008630137	4.572	0.3048	0.001	0
International Converter	IC1	0.000575342	3.048	0.3048	0.001	0
	IC2	0.000287671	9.144	0.762	7.62	394.26111
	IC3	0.000575342	10.67	0.7102	13.716	477.59444
	IC4	0.000863014	10.67	0.7803	10.668	490.37222
	IC5	0.000287671	10.67	0.8412	5.7912	408.15
	IC6	0.000863014	11.58	1.146	8.2296	491.48333
Kimberly Clark Corporation	KC1	0.042287671	3.048	0.3048	0.001	0
	KC2	0.000287671	3.048	0.5578	6.858	477.59444
	KC3	0.000287671	3.048	0.5578	8.01624	477.59444
	KC4	0.002876712	3.048	0.6614	13.5026	467.03889
	KC5	0.000575342	3.048	2.7432	12.3749	308.70556
	KC6	0.002876712	11.28	0.9144	13.5026	477.59444
	KC7	0.000287671	12.19	0.3566	9.2964	505.37222
Metal Exporters Inc.	ME1	0.94122	10.67	0.4572	28.7457	394.26111
	ME2	0.94122	10.67	0.6096	24.256	310.92778
	ME3	0.000252	10.67	0.3048	6.46786	310.92778
Mississippi Polymers	MP1	0.003452055	3.048	0.3048	0.001	0
	MP2	0.000575342	4.267	0.4054	7.62	463.70556
	MP3	0.001150685	11.89	0.509	12.131	672.03889
Timber Products Company	TIMPROD	0.003739726	3.048	0.3048	0.001	0
Tishomingo Acquisition LLC	TISHACQ	0.000575342	3.048	0.3048	0.001	0
Water Way, Inc.	WW	0.000287671	3.048	0.3048	0.001	0

5.2.2.2. NO_2 SOURCES

As with the SO_2 sources, the NO_2 sources in the Mississippi inventory were evaluated using the 20D rule and also whether they were within the MS Silicon significant impact area. Two sources excluded by the 20D Rule, Metal Exporters and Water Way, were identified as being within the significant impact area. Prior to running the analysis, it was discovered that Metal Exporters is out of business and no longer holds a permit, therefore, this source was not included in the analysis.

TVA Colbert was only modeled for part of the five year period due to the consent decree requiring some of the units to be shut down. Unit No. 5 was modeled for the first two years and then emissions were set to zero. Unit Nos. 1 through 4 were modeled for the first two and one-half years and then emissions were set to zero for these units.

The off-site sources included in the analysis are summarized in Table 6

TABLE 6 - NOX OFF-SITE INVENTORY

Facility	Model ID	Emission_Rate [g/s]	Height [m]	Diam [m]	Exit_Vel [m/s]	Exit_Temp [K]
Columbia Gulf Transmission	CGT1	0.12369863	3.658	0.0518	47.305	810.92778
	CGT2	0.017260274	4.572	0.2042	39.624	755.37222
	CGT3	12.06205479	6.706	3.6363	15.3924	672.03889
	CGT4	137.4147945	12.19	0.6096	37.3685	810.92778
	CGT5	2.833561644	18.29	2.7523	16.4897	688.70556
	CGT6	0.149589041	3.962	0.0396	102.657	810.92778
Kingsford Manufacturing Company	KMC2	0.085150685	3.048	0.3048	0	0
	KMC3	0.014958904	6.096	0.6096	16.1849	422.03889
	35101	9.349315068	31.09	3.5052	23.1953	1033.15
Tennessee Gas Pipeline Company, New Albany	TGPC1	0.013808219	3.048	0.3048	0	0
	TGPC2	23.60658904	6.706	0.6096	28.6512	674.81667
	TGPC3	2.805945205	7.925	0.2042	47.8231	644.26111
	TGPC4	22.07819178	7.925	0.509	32.004	700.37222
	TGPC5	6.258863014	9.144	0.4572	41.4223	674.81667
Water Way	WW1	0.041712329	3.048	0.3048	0	0
Packaging Corporation of America	TN2SB1213	2.717774284	48.77	2.438	14.9657	488.706
	TN2ST1198	24.94632037	76.2	3.901	12.2225	435.928
	TN2ST6009	0.713148004	22.86	1.219	13.4722	344.261
	TN2ST6025	0.521631226	22.86	1.372	8.13816	339.261
	TN2ST7214	2.351120451	54.41	2.591	16.4592	455.372
	TN2ST7215	10.5283829	54.56	3.353	22.2809	433.15
	TN2ST7216	2.351120451	76.2	2.438	19.2024	469.261
TVA Colbert	ALMMMM	534.7350051	183.5	8.016	6.919	424.817
	ALX001	64.63691273	9.693	3.871	44.2265	777.039
	ALX013	349.5181207	152.4	7.224	23.1343	417.039
	STCK1	64.63691273	9.693	3.871	44.2265	777.039
	STCK2	64.63691273	9.693	3.871	44.2265	777.039
	STCK3	64.63691273	9.693	3.871	44.2265	777.039
	STCK4	64.63691273	9.693	3.871	44.2265	777.039
	STCK5	64.63691273	9.693	3.871	44.2265	777.039
	STCK6	64.63691273	9.693	3.871	44.2265	777.039
	STCK7	64.63691273	9.693	3.871	44.2265	777.039
Cherokee Nitrogen Company	7010013002	17.72916177	15.39	1.219	16.5506	449.817
	7010013006	1.15036065	12.19	1.067	19.812	554.261
	7010013023	9.320063225	30.48	1.219	20.2692	422.039
	7010013001B	10.59012186	21.34	2.438	3.10896	477.039
Tx Eastern Trans-Barton	7010041001	21.59099681	5.486	3.139	28.4988	777.039
Wise Alloys Plant	WAPX001	4.031932178	15.24	1.829	0.00701	449.817
	WAPX048	0.26333557	15.24	0.701	2.37744	464.261
	WAPX051	0.408233133	16.46	0.914	4.48056	464.261
	WAPX052	0.856785588	15.24	1.981	9.6012	472.039
	WAPX052A	0.856785588	13.11	2.347	15.1181	504.817
	WAPX053	1.310377958	18.29	2.134	20.3606	477.039

Facility	Model ID	Emission_Rate [g/s]	Height [m]	Diam [m]	Exit_Vel [m/s]	Exit_Temp [K]
	WAPX058	29.29450723	30.48	1.768	11.1252	977.039
	WAPX063	1.889968208	30.48	1.463	5.54736	699.817
	WAPX069	0.277195337	15.24	0.61	4.38912	464.261
	WAPX071	0.248215825	16.46	0.914	4.48056	464.261
	WAPX073	0.541790886	5.944	0.61	11.0642	494.261
	WAPX099A	2.419159307	15.55	1.311	152.4	533.15
	WAPX103	0.604789827	18.23	1.067	15.8496	533.15
	WAPX104	0.166317202	15.24	0.701	2.37744	464.261
	WAPX105	0.26333557	15.24	0.61	3.13944	464.261
	WAPX110	0.942464147	16.15	0.975	3.2004	490.928
	WAPX111	1.693411515	16.15	0.975	12.8626	490.928
	WAPX112	0.546830802	13.32	1.189	2.34696	504.817
	WAPX117	0.541790886	5.944	0.61	11.0642	494.261
	WAPX118	0.201596609	4.572	0.457	6.06552	365.928

5.2.3. Cumulative Impact Receptor Network

The cumulative impact receptor network was based upon the significant impact receptor network. The receptors determined to be significant in the significant impact analysis were retained as well as the next receptor out in all directions from the significant receptor. Figure 6 illustrates the receptor network for the SO_2 cumulative impact and Figure 7 illustrates the NO_2 cumulative impact receptor network. MS Silicon significant receptors are indicated by the dark squares and the retained receptors are green crosses.

5.2.4. AAQS Modeling Results

Compliance with the air quality standards was determined by adding the background within the model. To account for the shutdown of the TVA Colbert Units, each year was modeled separately and the individual years 4th highest maximum daily impact were averaged by receptor to obtain the 5-year average for SO_2, the individual years 8th highest maximum daily impact were used for NO_2. Impacts were found to be above the NAAQS as summarized in Table 7 and a culpability analysis was required for both NO_2 and SO_2.

TABLE 7 - AAQS MODELING RESULTS

Pollutant	Averaging Period	NAAQS/ NMAAQS ($\mu g/m^3$)	Modeled Results ($\mu g/m^3$)	UTM X (M)	UTM Y (M)
NO_2*	1-hour	188	886.99	418965	3838020
SO_2	1-hour	196.5	1075.80	416965	3839020

*Modeled NOx results adjusted by ARM of 0.8 to determine NO_2 impact.

6.0 Culpability Analysis

6.1. SO_2 Contribution

Receptors from the NAAQS analysis where violations of the SO_2 1-hour standard were identified were included in an analysis to determine source contributions to the violations. A source group for each competing source was included in the analysis to determine which sources might contribute to modeled violations. Figure 8 illustrates the culpability grid along with the location of competing sources. These receptors represent locations from the NAAQS analysis where exceedances of the NAAQS were identified. The maximum source contributions to an exceedance are summarized in Table 8. These contributions are the maximum of any exceedance and do not represent the same receptor or rank of exceedance.

TABLE 8 - MAXIMUM CONTRIBUTION TO SO2 EXCEEDANCE (COARSE GRID)

Facility	Max Contribution to a Predicted Exceedance (ug/m3)
MS Silicon	0.195888
Kingsford	0.009182
Metal Exporters	2.24194
MS Polymers	0.00005
Kimberly Clarke	0.000648
TVA Colbert	1004.864008
Caterpillar	0.000582
Columbia Gulf	0.000896
Ergon	0.238076
Ershing	0.013152
International Converter	0.00005
Timber Products	0.000038
Tishomingo Acquisitions	0.000006
Packaging Corporation	22.512486
Water Way	0.00057
Background	70.74

EPA requested that all exceedances be defined within 100 meter spacing. A 10 receptor by 10 receptor 100-meter grid was placed around each receptor where an exceedance of the SO_2 standard was predicted. This provided full 100-meter coverage in the area of elevated terrain on the eastern side of the modeling domain. This fine receptor grid results in 125,200 receptors as pictured in Figure 9. Predicted exceedances of the standard were anticipated from the TVA Colbert plant for over one hundred of the impact ranks at each receptor. This coupled with conducting the analysis by individual years would result in tens of millions of records to manage for each year of the analysis. To reduce the amount of records to be managed, the significance analysis was run again on the refined grid. Receptors where MS Silicon did not have a significant impact were discarded. Additionally, receptors which were greater than 50 kilometers, the extent of the AERMOD model, were discarded. The resulting receptor network is pictured in Figure 10.

The culpability analysis with the previously described fine receptor grid was performed with source groups for MS Silicon and TVA Colbert. Source groups were not used for the remaining facilities to reduce the required computer memory. The maximum contributions to predicted exceedances are summarized in Figure 9. Again, these values do not occur at the same receptor/exceedance rank, but represent the maximum of all exceedances. The maximum contribution to an exceedance for both MS Silicon and TVA Colbert increased from the course to the fine grid analysis. This difference is attributable to the impacts occurring in complex terrain southeast of MS Silicon and southwest of TVA Colbert, i.e. the initial spacing was not sufficient to account for the terrain changes.

TABLE 9 - SO2 CULPABILITY SOURCE CONTRIBUTIONS FINE GRID

Facility	Max Contribution to a Predicted Exceedance (ug/m3)
MS Silicon	7.78839
TVA Colbert	1254.370408
Other Sources	26.296754
Background	70.74

The MS Silicon contribution to predicted exceedances is below the EPA significant impact level of 7.86 ug/m^3. The MS Silicon contributions of greater than 1 ug/m^3 to predicted exceedances are pictured in Figure 11. These maximum contributions are located in the elevated terrain to the southeast of the facility and are within areas of full 100-meter spacing. The five year summary of these contributions are identified in Table 12, with the total being inclusive of the background monitored value.

6.2. NO_2 CONTRIBUTION

Receptors from the initial NAAQS analysis where violations of the NO_2 1-hour standard were identified were included in an analysis to determine source contributions to the violations. A source group for each competing source was included in the analysis to determine which sources might contribute to modeled exceedances. The maximum contribution to the predicted exceedances are summarized in Table 10.

TABLE 10 - MAXIMUM CONTRIBUTION TO PREDICTED EXCEEDANCE OF NO2 1-HR STANDARD

Facility	Max Contribution to a Predicted Exceedance (ug/m3)
MS Silicon	4.398456
Kingsford	657.076526
Cherokee Nitrogen	241.278758
Texas Eastern Trans	4.796566
TVA Colbert	822.850778
Columbia Gulf	625.424212
Tenn. Gas Pipeline	13.750358
Packaging Corp	5.657428
Wise Alloy Plant	51.627158
Water Way	0.138922
Background	63.92

Receptor spacing was expanded around each receptor with a predicted exceedance in the initial NAAQS analysis to 100-meter spacing out half the distance of the current receptor spacing. The only source groups included in this analysis were MS Silicon and the source group ALL to prevent exceeding memory capability. The summary of the maximum contribution to an exceedance is included in Table 11. The location of MS Silicon contributions greater than 1 ug/m^3 to NO_2 impacts is depicted in Figure 12. A larger scale view is depicted in Figure 13, showing the maximum contribution as a red star. Gray squares indicate locations where the receptor had cumulative impacts greater than the NO_2 NAAQS. The top ten contributions to a modeled exceedance of the NO2 NAAQS by MS Silicon are summarized in Table 13. Although the expanded receptor grid did not encompass the predicted exceedance with non-violating receptors out to 100-meters, there are receptors within 300 meters with no violations.

TABLE 11 - REFINED GRID CONTRIBUTION TO MODELED EXCEEDANCE

Facility	Max Contribution to a Predicted Exceedance (ug/m3)
MS Silicon	5.378944
Surrounding Sources	1369.740066
Background	63.92

Because the maximum contribution from MS Silicon fell on the edge of the area where 100-meter spacing was used, the grid was expanded in that area. The years were not modeled individually and TVA Colbert was included with potential emissions over the 5-year period. The results show that the maximum contribution by MS Silicon to a modeled exceedance was 6.0 ug/m^3. Figure 14 depicts the location of the maximum contribution by MS Silicon. The red circle denotes the location of the maximum before the grid was expanded. Note that the predicted high at this location is greater than that previously reported because TVA emissions were included in every year of the five-year period. The shaded area indicates the area where a modeled exceedance of the standard was predicted. The labeled values are the maximum contribution from MS Silicon from any rank of modeled exceedance.

TABLE 12 - MS SILICON MAXIMUM CONTRIBUTION TO PREDICTED SO2 EXCEEDANCE

UTM X	UTM Y	Rank	Silicon 2007	TVA 2007	All 2007	Silicon 2008	TVA 2008	All 2008	Silicon 2009	TVA 2009	All 2009	Silicon 2010	TVA 2010	All 2010	Silicon 2011	TVA 2011	All 2011	Silicon 5yr Avg	TVA 5yr Avg	All 5yr Avg
414465	3841020	38TH	0.04	180.47	251.30	0.02	237.20	307.99	0.00	140.74	211.50	38.88	2.85	112.85	0.00	64.68	135.43	7.79	125.19	203.81
414365	3841020	37TH	0.11	184.32	255.35	0.09	240.39	311.39	0.03	131.87	202.69	37.96	2.84	111.91	0.00	66.96	137.71	7.64	125.28	203.81
414565	3841020	40TH	0.02	179.97	250.75	0.01	240.40	311.19	0.02	136.58	207.38	36.99	2.81	110.91	0.00	56.14	126.88	7.41	123.18	201.42
415365	3841820	41ST	0.03	194.50	265.32	0.01	244.37	315.14	0.00	112.12	182.87	33.96	1.86	106.79	0.00	49.71	120.45	6.80	120.51	198.12
415865	3842020	43RD	0.08	201.67	272.64	0.02	242.65	313.44	0.00	101.55	172.30	33.34	1.94	106.27	0.00	50.74	121.49	6.69	119.71	197.23
414865	3834720	57TH	0.03	207.42	278.24	0.01	285.48	356.29	0.05	210.12	281.00	30.82	1.38	103.10	0.01	224.78	295.55	6.18	185.84	262.84
416765	3839220	57TH	0.01	212.28	283.04	0.01	372.28	443.05	0.02	270.06	340.84	30.64	1.60	103.19	0.00	148.39	219.13	6.13	200.92	277.85
415465	3836120	57TH	0.05	237.68	308.54	0.02	346.02	416.82	0.02	302.54	373.35	29.19	0.78	100.81	0.03	304.71	375.55	5.86	238.34	315.01
414865	3834620	57TH	0.03	210.76	281.57	0.01	286.84	357.65	0.01	202.55	273.33	28.91	0.66	100.40	0.01	256.17	326.95	5.79	191.39	267.98
412265	3832220	57TH	0.00	162.75	233.51	0.01	228.38	299.15	0.01	161.64	232.45	27.30	1.42	99.62	0.01	155.20	226.00	5.47	141.88	218.14
415065	3834820	57TH	0.02	219.68	290.47	0.02	326.40	397.19	0.00	214.69	285.44	26.92	0.68	98.43	0.01	305.28	376.06	5.40	213.34	289.52
415865	3837020	78TH	0.03	139.45	210.27	0.01	234.76	305.54	0.02	164.95	235.75	0.01	129.87	200.66	26.31	0.95	98.11	5.28	134.00	210.07
415165	3834020	75TH	0.00	125.39	196.14	0.01	200.81	271.58	0.03	140.58	211.41	0.01	150.03	220.83	16.97	0.46	88.25	3.41	123.45	197.64
415765	3835920	75TH	0.01	147.22	217.98	0.02	269.09	339.89	0.04	175.34	246.27	0.02	208.54	279.33	16.89	0.51	88.22	3.40	160.14	234.34
415165	3835220	78TH	0.01	134.37	205.13	0.04	249.78	320.66	0.01	160.18	230.95	0.02	186.60	257.38	15.88	0.35	87.03	3.19	146.26	220.23
416065	3836320	75TH	0.05	150.69	221.56	0.01	275.67	346.43	0.00	162.72	233.47	0.01	181.14	251.92	13.58	0.89	85.41	2.73	154.22	227.76
415965	3835920	75TH	0.05	144.29	215.16	0.02	265.08	335.87	0.00	146.29	217.04	0.02	176.28	247.11	13.17	0.26	84.23	2.65	146.44	219.88
415165	3836120	78TH	0.01	126.00	196.77	0.00	226.87	297.62	0.03	150.50	221.32	0.00	125.64	196.39	12.99	0.67	84.51	2.61	125.94	199.32

TABLE 13 - TOP TEN MS SILICON CONTRIBUTIONS TO A MODELED EXCEEDANCE OF THE NO2 NAAQS.

x	y	Rank	Silicon 2007	All 2007	Silicon 2008	All 2008	Silicon 2009	All 2009	Silicon 2010	All 2010	Silicon 2011	All 2011	Silicon 5-yr Avg	All 5-yr Avg
381565	3846420	12TH	2.41722	187.2249	2.19216	228.5719	18.24467	137.354	1.8227	228.057	2.21797	170.1538	5.378944	190.2723
381765	3846020	12TH	1.95542	186.5159	2.13516	227.9523	17.15318	135.1598	1.56037	228.4659	1.79621	166.7905	4.920068	188.97689
373665	3852820	18TH	0.00055	251.1337	0.00359	212.7812	0.00427	126.4519	0.00177	228.7708	23.77017	128.5266	4.75607	189.53283
381765	3845920	12TH	2.33518	194.221	1.98075	228.6338	17.03874	135.5741	1.22667	215.1604	0.9718	170.0311	4.710628	188.72408
381865	3845720	8TH	4.57462	189.2286	4.86011	191.6561	3.63831	198.5237	5.85675	193.4129	4.58846	176.4317	4.70365	189.85061
381765	3845520	13TH	0.35012	200.6464	1.29726	243.9642	16.39772	136.7854	2.3795	221.0597	2.52363	155.1532	4.589646	191.52178
381665	3846220	8TH	4.48591	199.8747	4.41367	204.6712	3.81624	213.5461	5.26432	196.5375	4.95695	189.1559	4.587418	200.75708
373665	3852920	17TH	0.00056	252.8662	0.00458	206.1294	0.00634	137.6631	0.00149	239.9202	22.49298	127.2003	4.50119	192.75583
381465	3846020	13TH	0.18124	175.3002	0.26949	242.1014	17.56022	139.9545	1.79574	229.3548	2.11224	163.13	4.383786	189.96819
381465	3845920	13TH	0.64779	172.8927	0.58772	236.6421	17.28878	140.0533	1.55616	234.7682	1.80021	166.4681	4.376132	190.16487

7.0 CONCLUSIONS

The modeling performed indicates the air quality within the modeling domain of the MS Silicon facility is impacted by surrounding sources above the SO_2 and NO_2 1-hour NAAQS. The MS Silicon contribution to each predicted exceedance is below the EPA modeling significance level and does not, therefore, cause or contributed to any modeled exceedance.

Figures

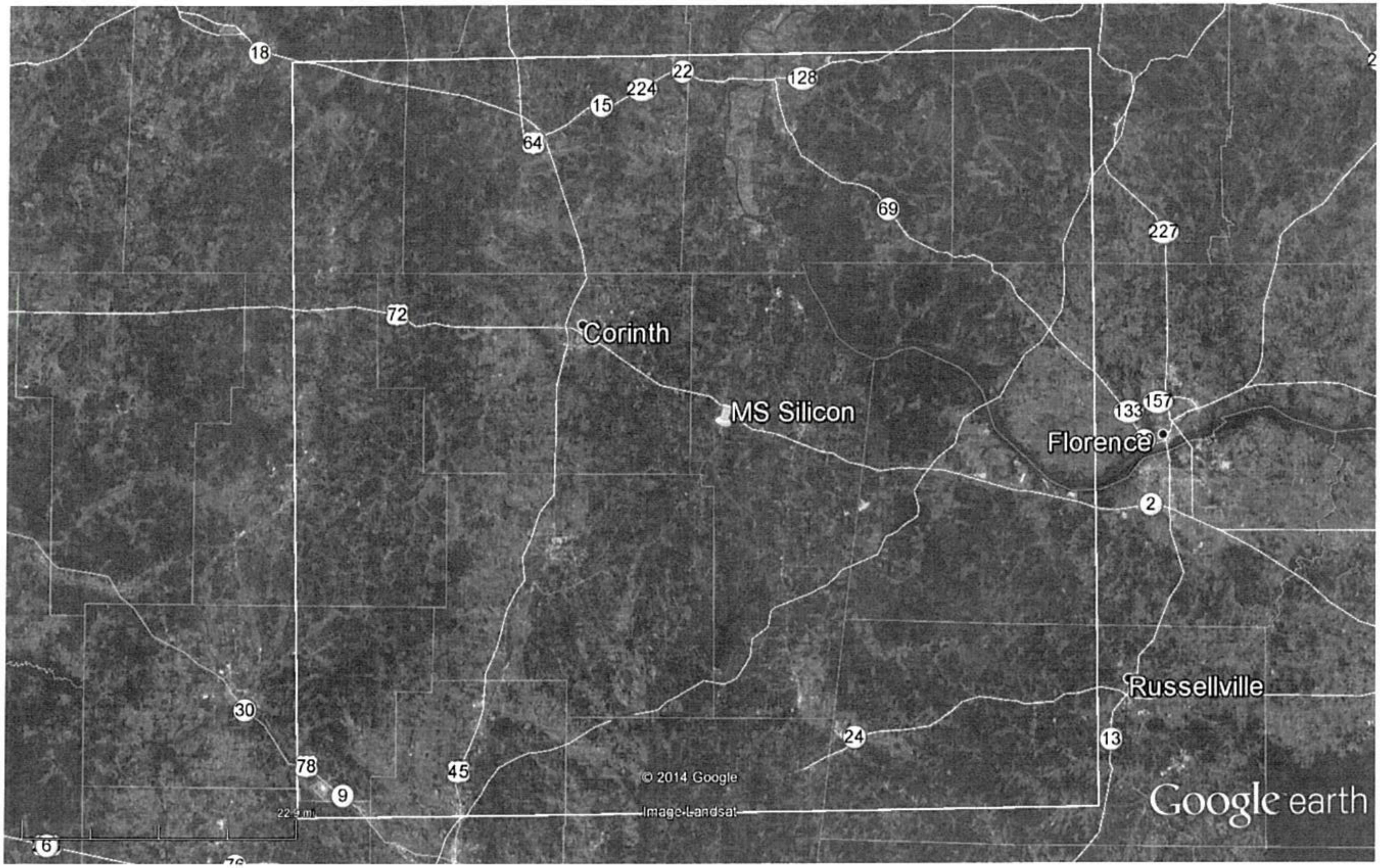


FIGURE 1 – FACILITY LOCATION

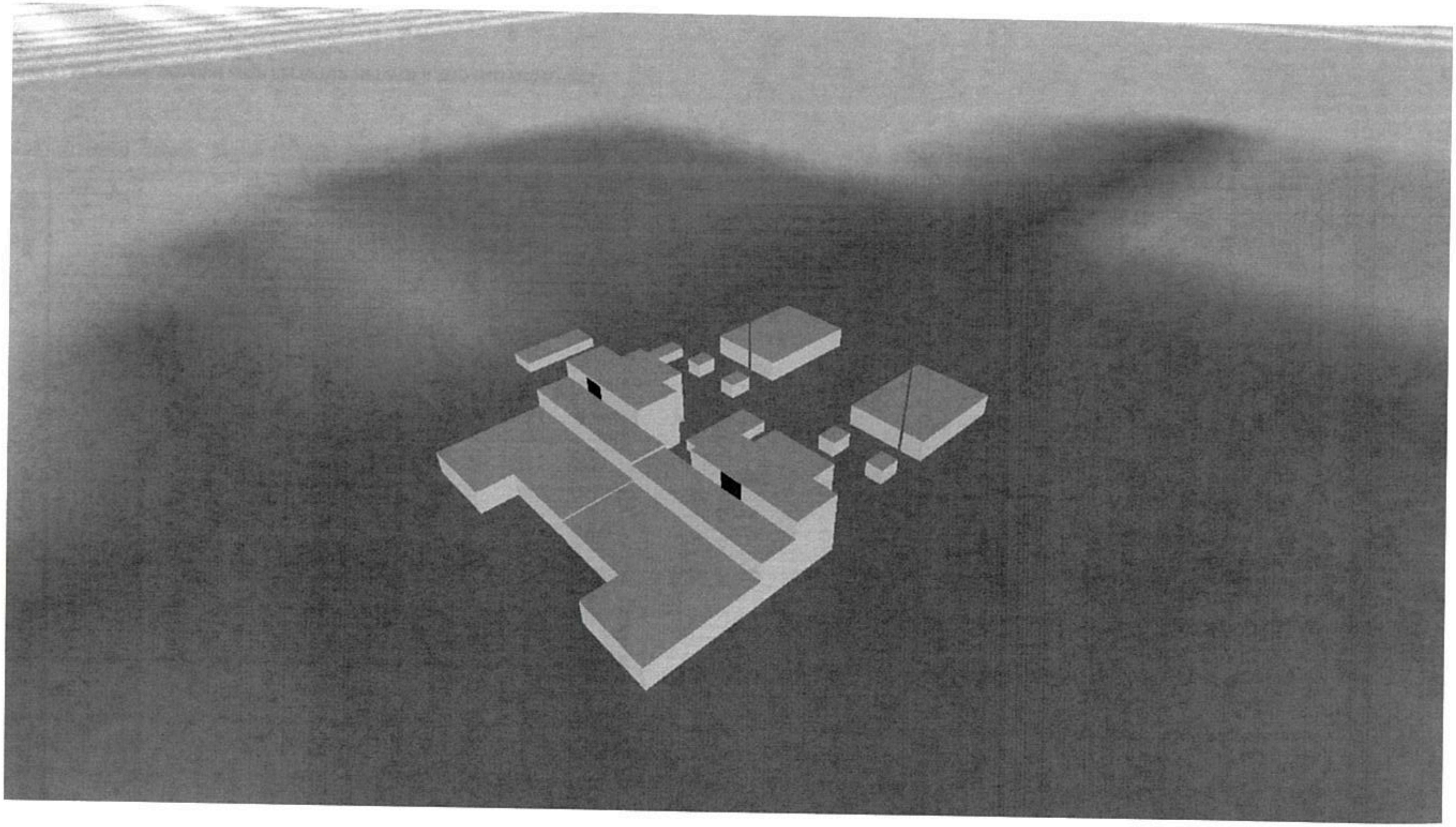


FIGURE 2 - SITE BUILDING LAYOUT

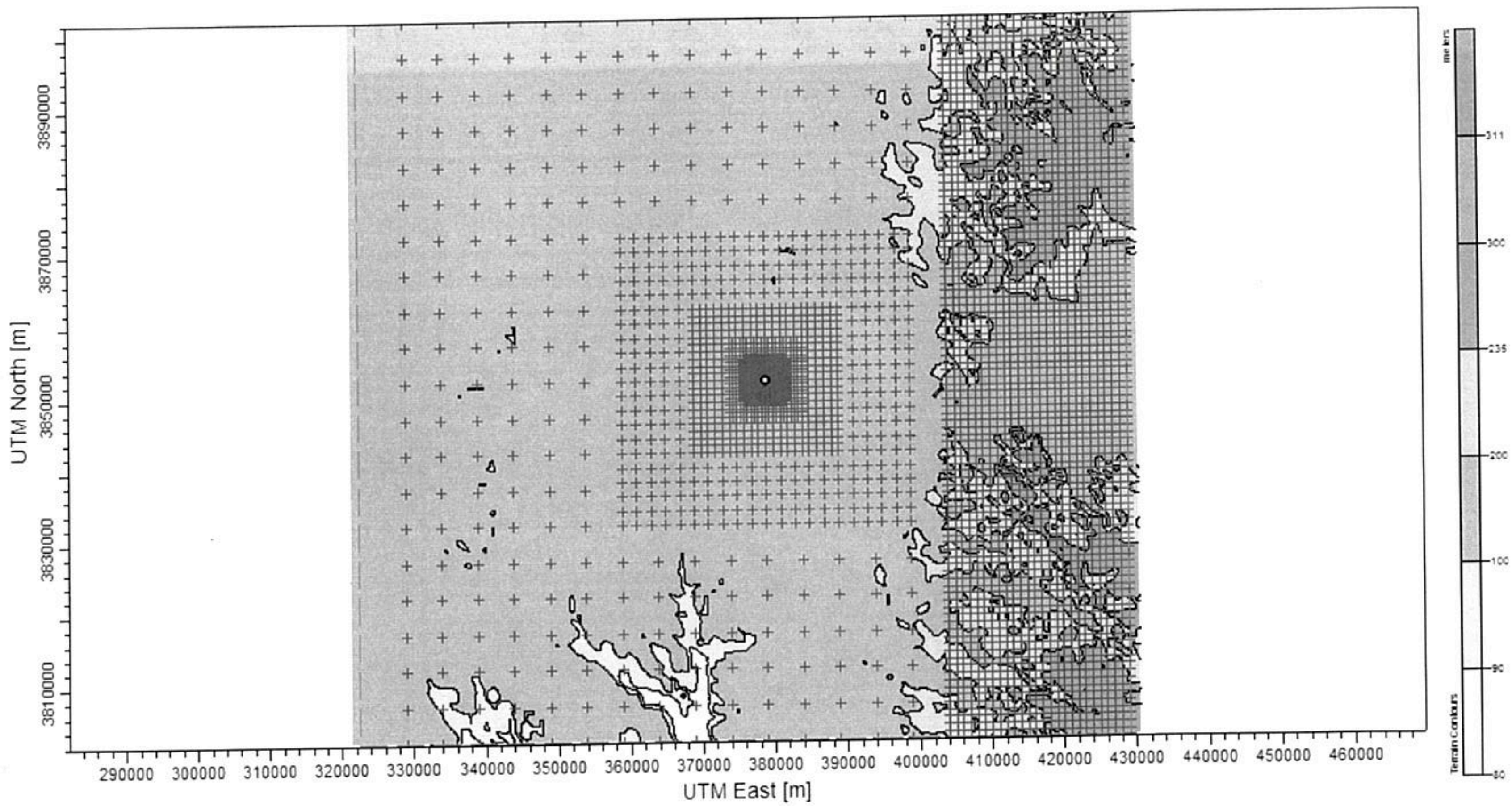


FIGURE 3 - MODELING DOMAIN WITH RECEPTOR NETWORK AND NED ELEVATONS

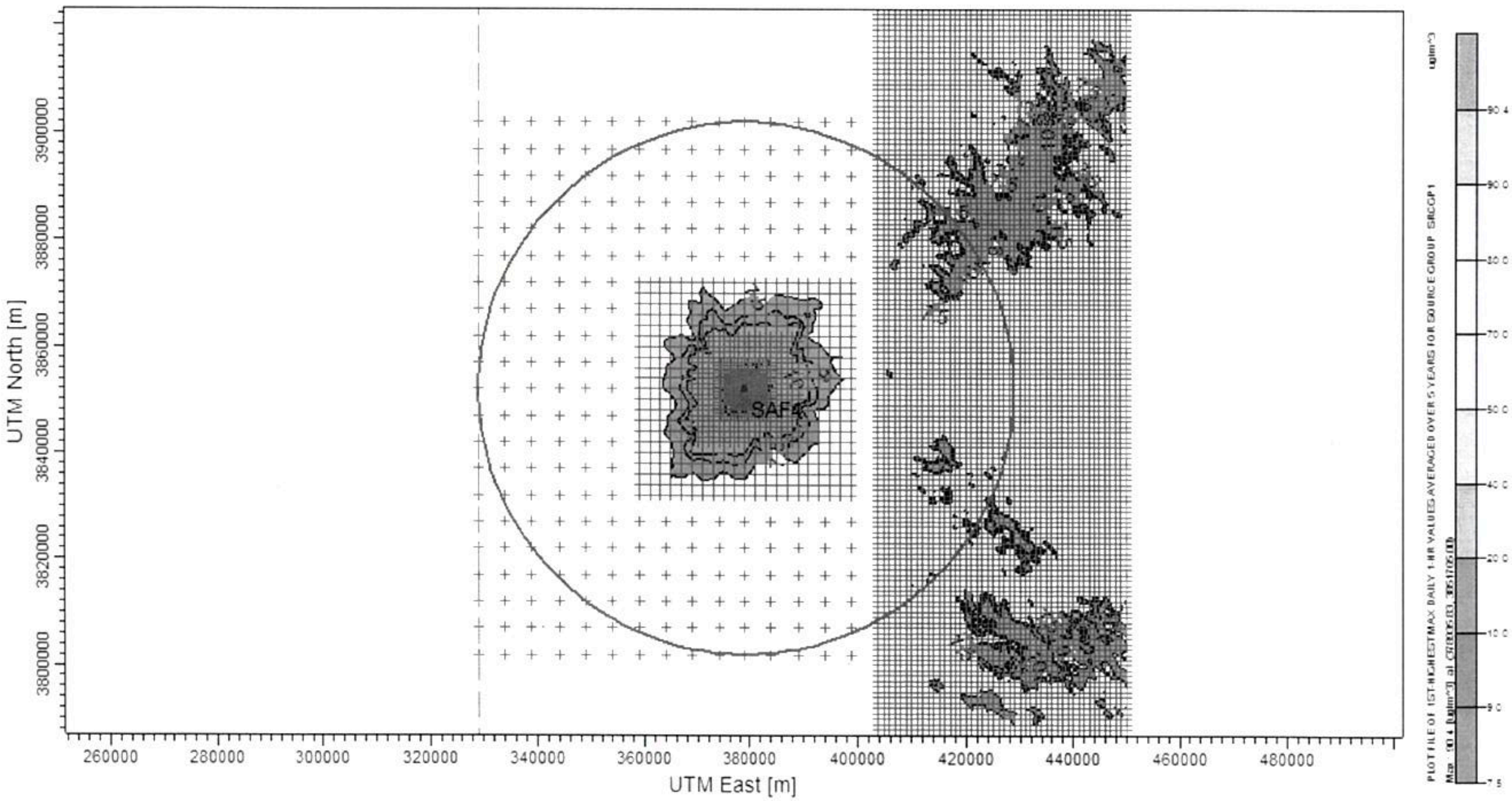


FIGURE 4 - NO_2 SIGNIFICANT IMPACT AREA

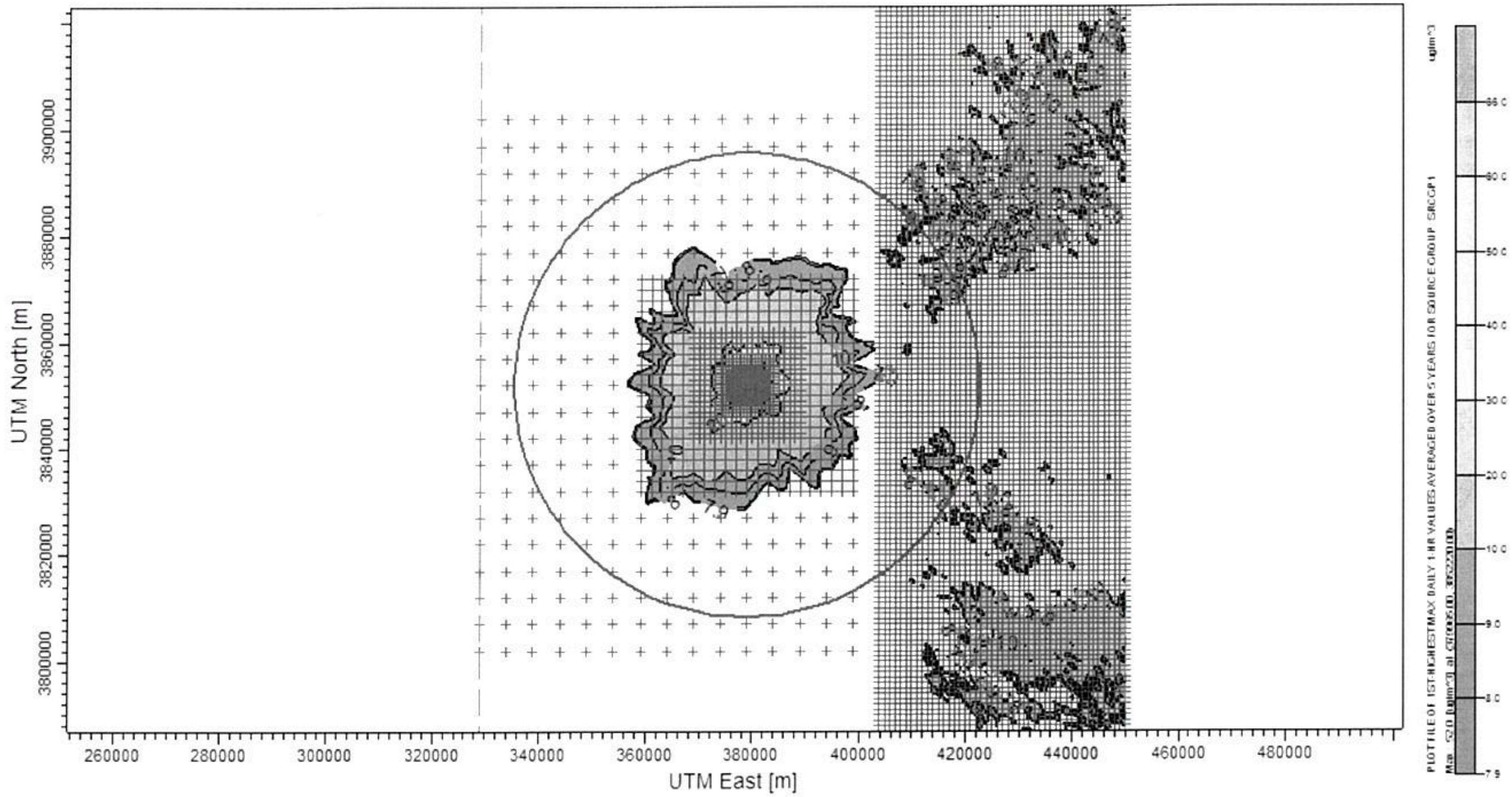


FIGURE 5 - SO2 SIGNIFICANT IMPACT AREA

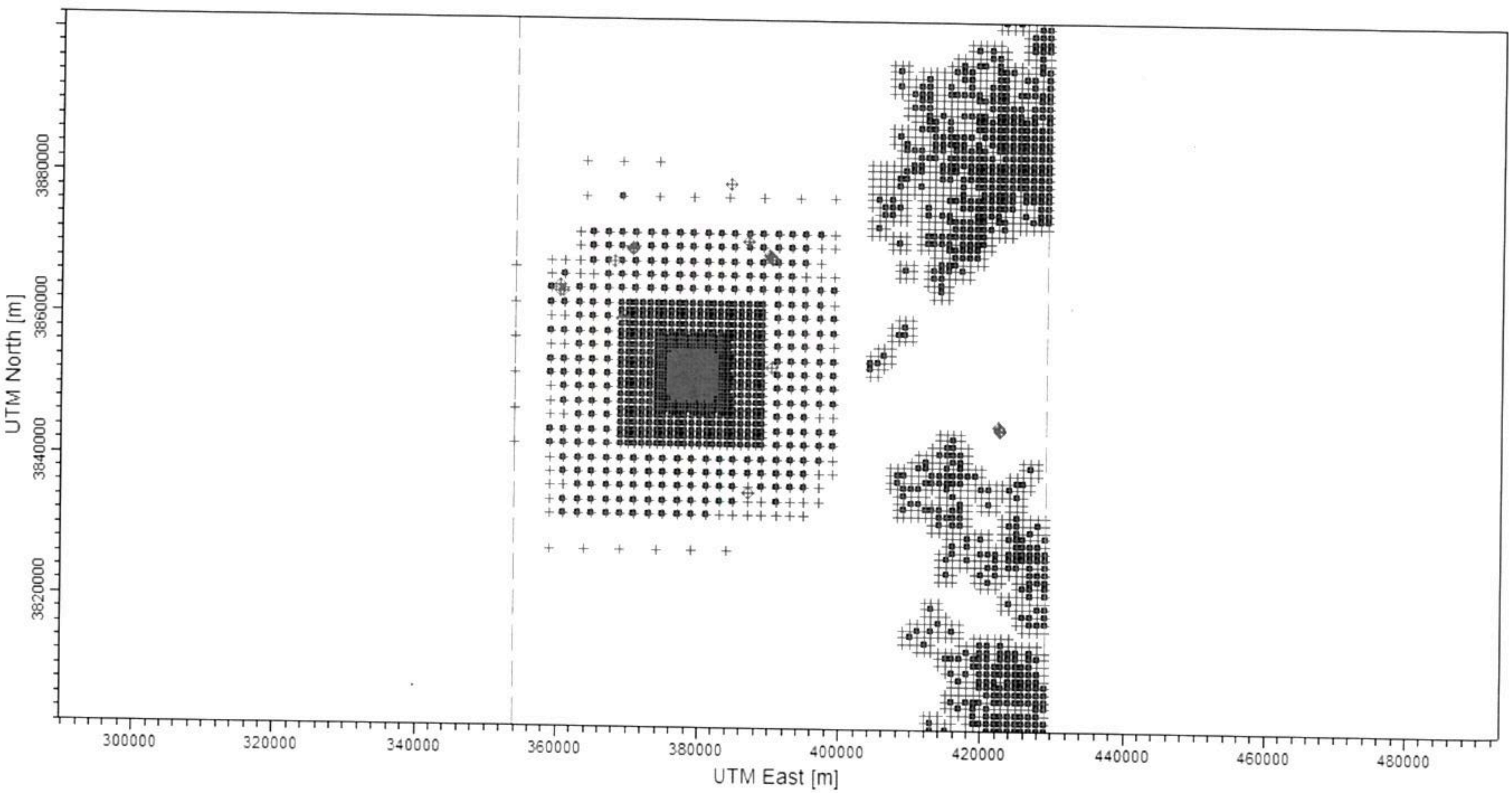


FIGURE 6 - SO_2 CUMULATIVE IMPACT RECEPTOR NETWORK AROUND SIGNIFICANT RECEPTORS

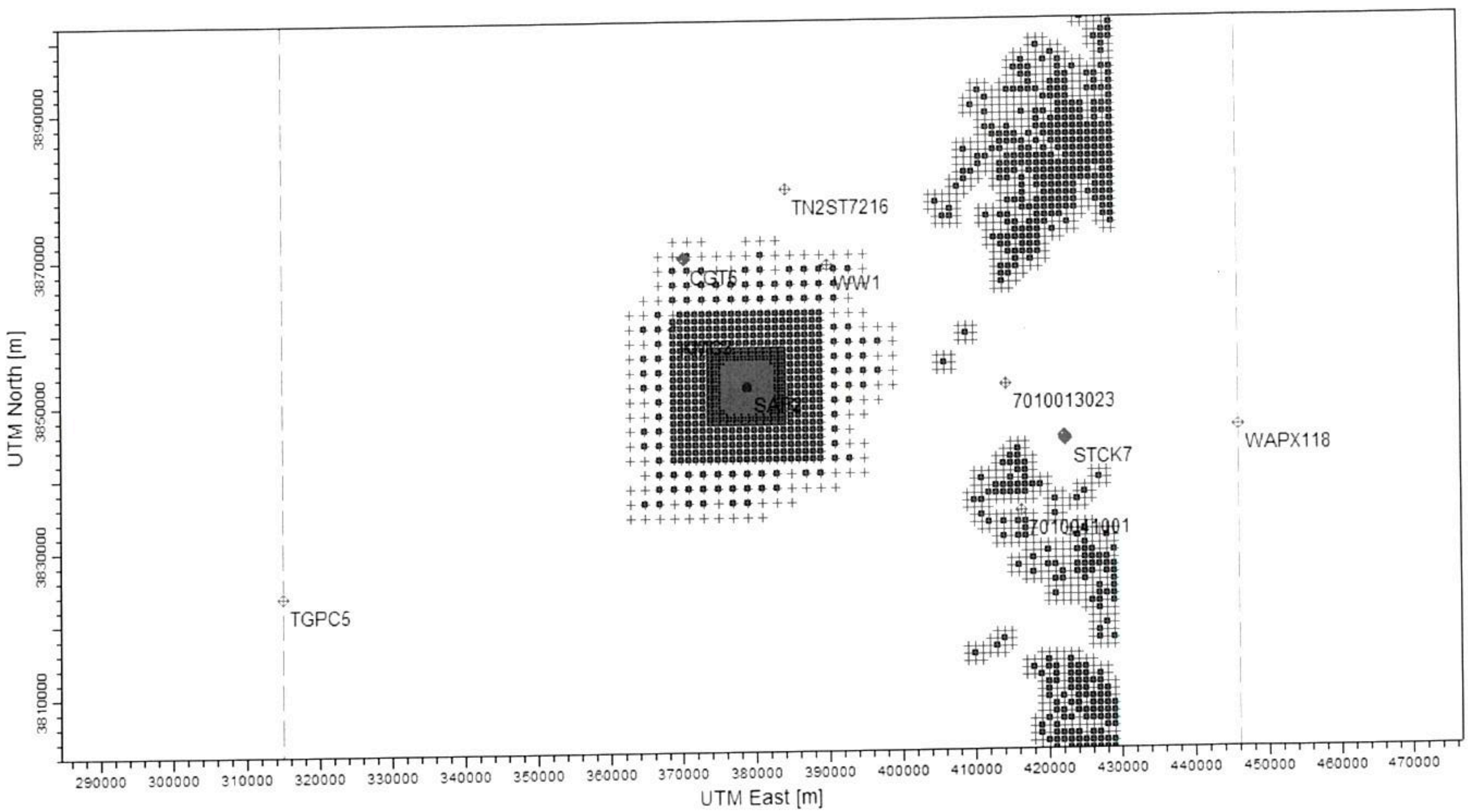


FIGURE 7 - NO_2 CUMULATIVE IMPACT RECEPTOR NEWORK

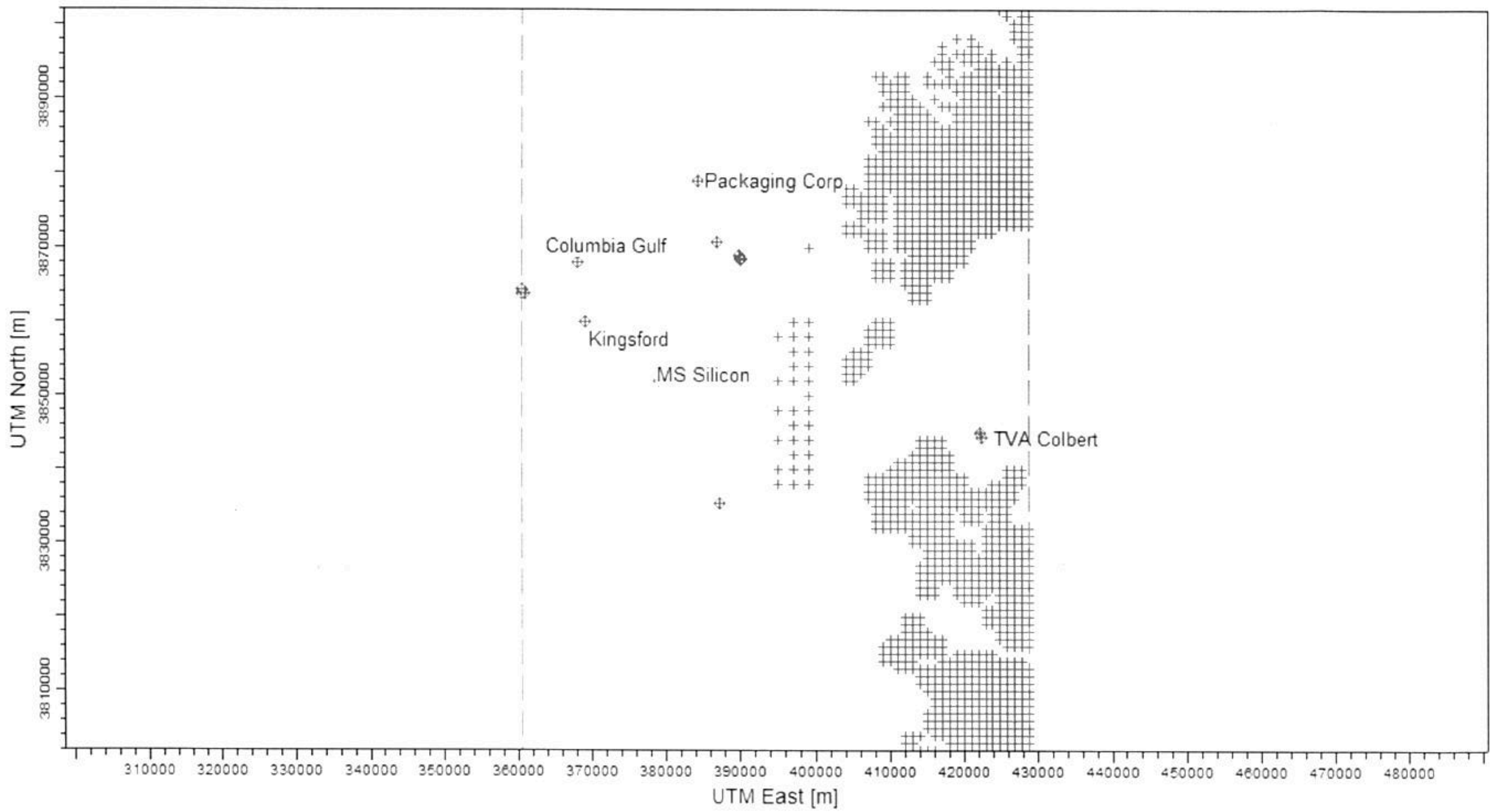


FIGURE 8 - SO_2 CULPABILITY COARSE GRID

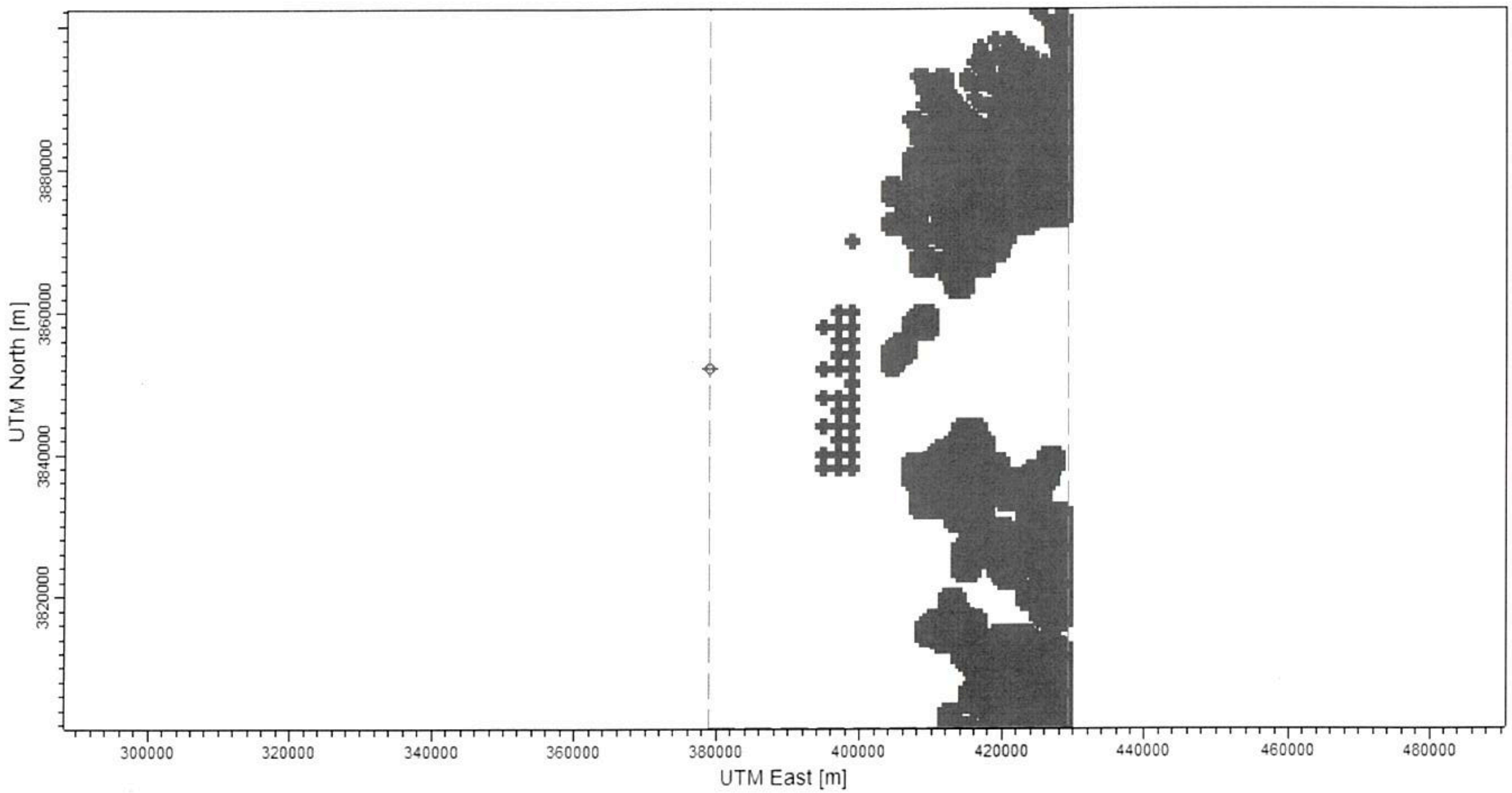


FIGURE 9 - SO2 CULPABILITY FINE RECEPTOR GRID

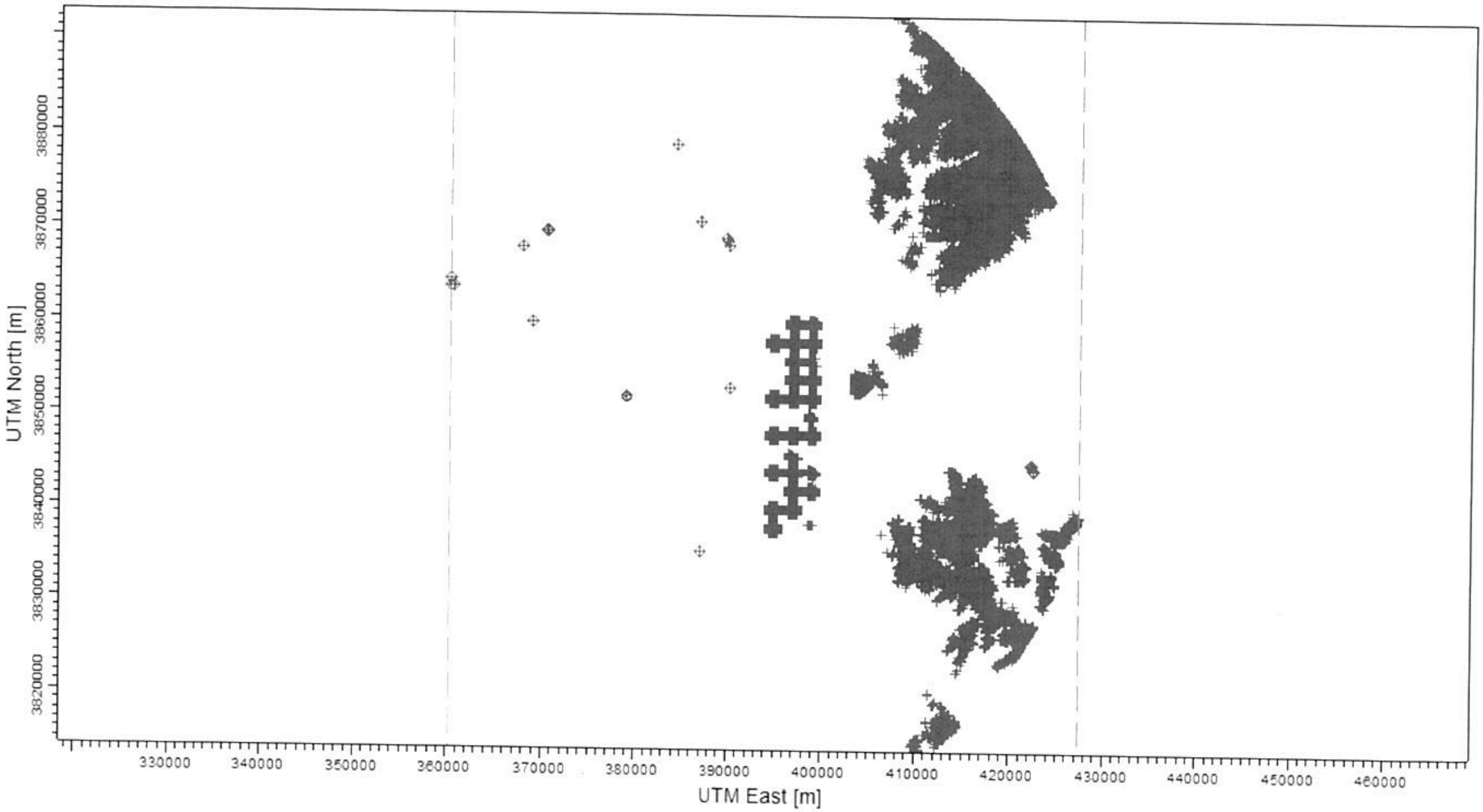


FIGURE 10 - SO2 CULPABILITY FINE GRID WITHIN 50 KM AND MS SILICON SIA

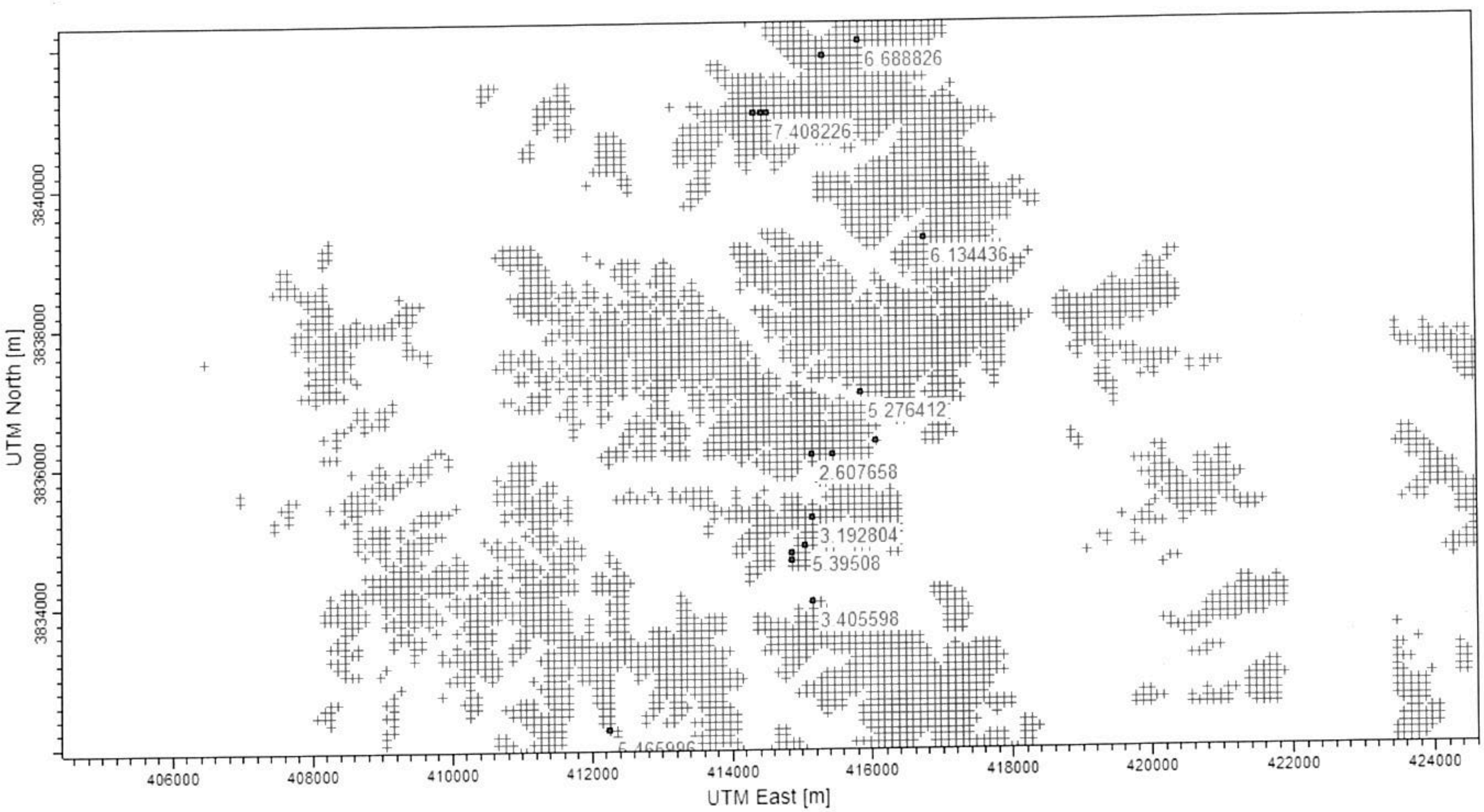


FIGURE 11 - MS SILICON CONTRIBUTION TO SO2 EXCEEDANCE GREATER THAN 1 UG/M3

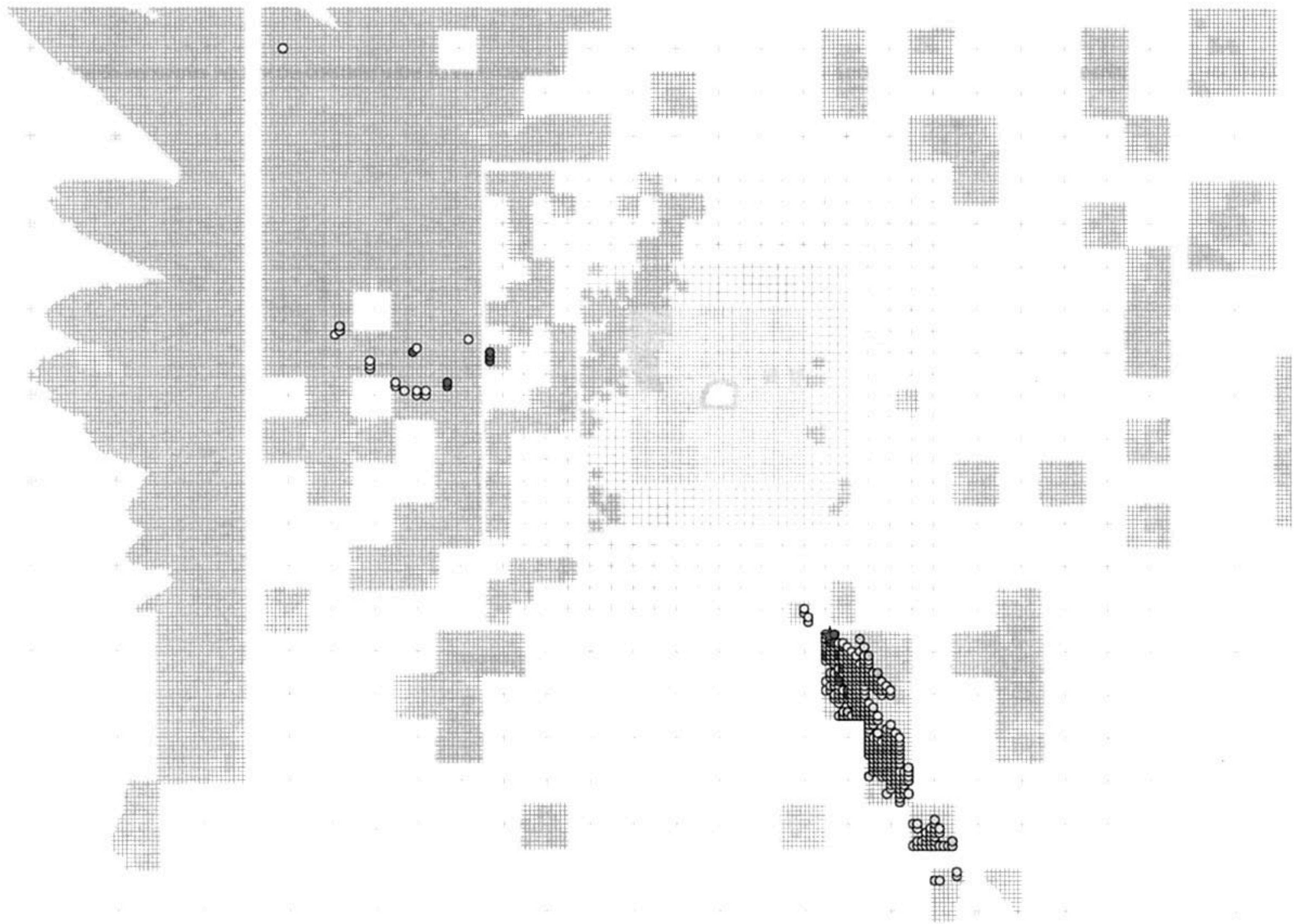


FIGURE 12- MS SILICON CONTRIBUTION TO NO2 EXCEEDANCE GREATER THAN 1 UG/M3

FIGURE 13 - LOCATION OF MAXIMUM MS SILICON CONTRIBUTION TO AN EXCEEDANCE (RED STAR), MS SILICON CONTRIBUTION > 1 UG/M3 (CIRCLES), MODELED EXCEEDANCE (GREY SQUARES)

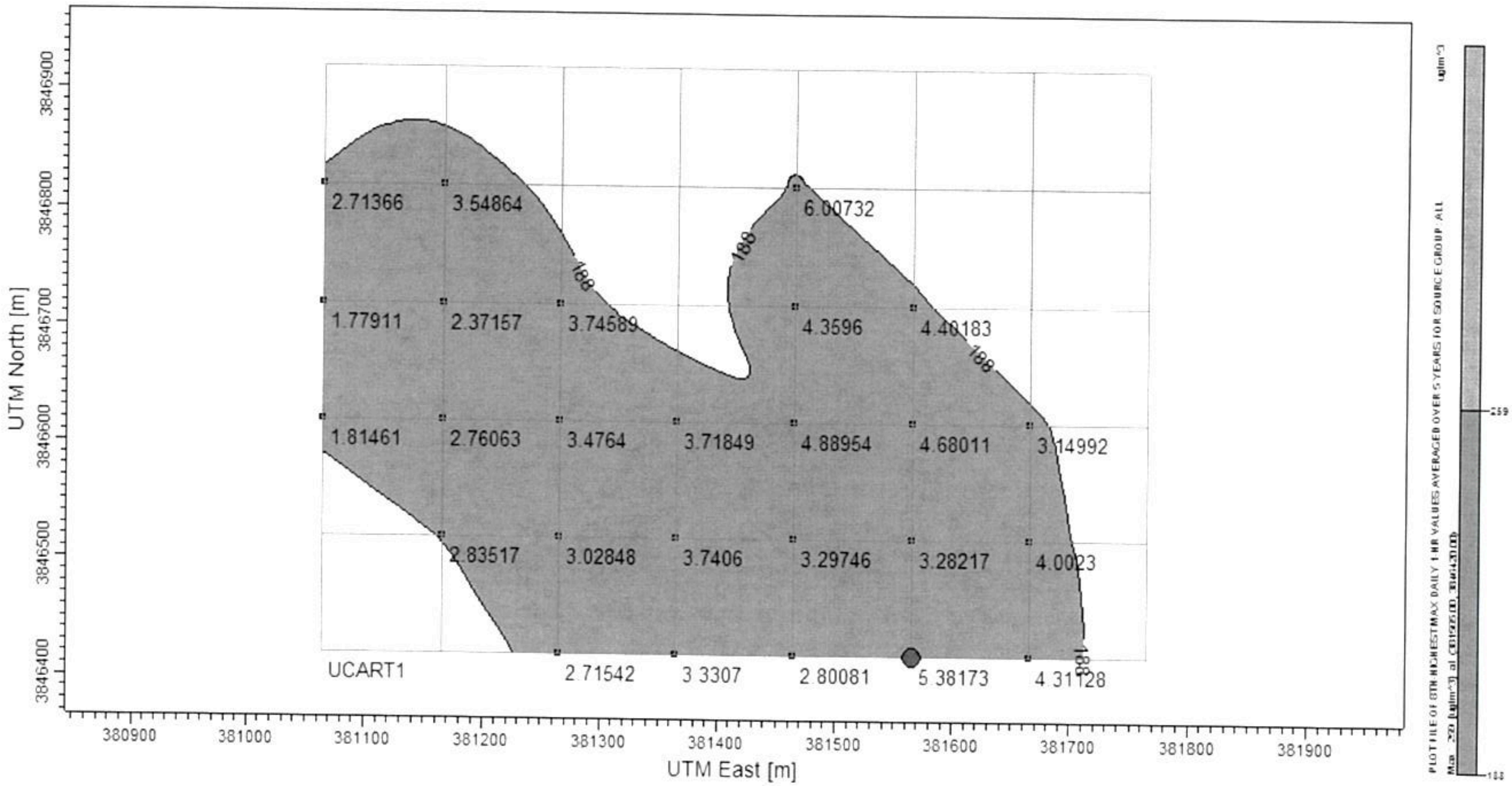


FIGURE 14 - MS SILICON MAXIMUM CONTRIBUTION TO A MODELED EXCEEDANCE.

ATTACHEMENT 1 – BASIS FOR TVA EMISSION INCLUDED IN THE MODELING

The NO_2 and SO_2 "1-hour" standards are based on the 98th percentile of the maximum daily 1-hour emissions averaged over 3-years. In modeling, this is approximated using a 5-year meteorological dataset and averaging across 5-years. TVA Colbert is under a consent decree and will be shutting down Unit No. 5 by December 31, 2015, and Units 1-4 will be shut down by June 30, 2016. Unit 5 could only be operated, at most, for one year simultaneous with MS Silicon and Unit 1-4 could only be operated for 1 ½ years simultaneous with MS Silicon. This represents 1/3 of the standard averaging period for Unit 5 and 1 ½ of the standard averaging period for Units 1-4. To simulate this through modeling, Unit 5 was included in the first 2 years of modeled meteorology and Unit 1-4 was included in the first 1 ½ years of modeled meteorology.

The EPA had expressed concerns that each year of meteorology may not contain worst case conditions and results may be skewed depending on which years of data were used for TVA operating or not operating. In order to alleviate these concerns the 5-years of meteorological data were looked at in terms of wind speed class and wind direction. The frequency of occurrence for wind speed class and direction is shown on the following page. The top most shaded area represents times when the wind is blowing from TVA towards MS Silicon for a wind direction within 45 degrees of a direct azimuth from TVA to MS Silicon. The bottom shaded area represents a wind direction from MS Silicon to TVA. Wind Rose are presented for each year on the page following the table.

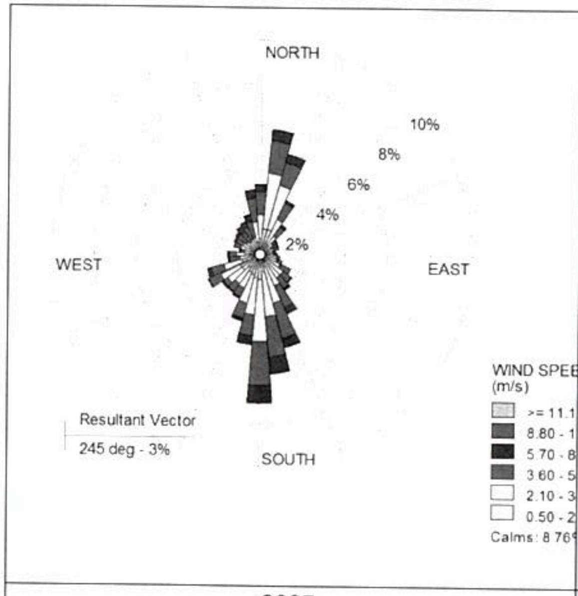
The frequency of occurrence in the two wind directions was evaluated to determine if there would be any bias in the selected years in which TVA would be considered to be operating. If the frequency of occurrence for all years was 4 or below or the frequency of occurrence for all years was above 4 then the years were considered to interchangeable. If some years were at 4 or below while other years were above, a bias was considered. The wind direction and stability class where it was considered that bias may be introduced are highlighted.

For the wind directions from TVA to MS Silicon, the year 2008 appeared to have a bias in the 5.7-8.8 m/s wind class. As TVA was considered to be operating all units for this year of meteorology, this occurrence of wind speeds and direction and the impacts associated were accounted for in the modeling. For the year 2009 and the 8.8-11.1 m/s wind speed class there was one occurrence that was not present in any other year. This occurrence occurred in the first half of 2009 and while all of TVA units were not included at this time it did include Units 1-4. This is only one occurrence and it is not expected to impact the predicted design value.

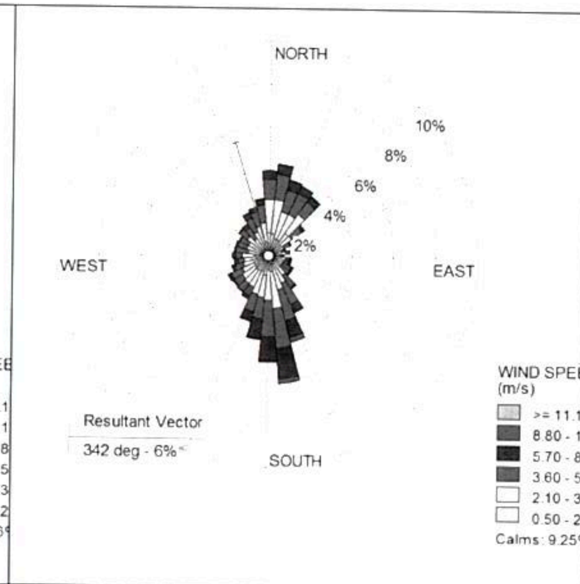
There is one wind speed class and direction identified in the year 2010 that doesn't appear to be represented in the other years. This is during a time when TVA was not considered to be operating Units 1-5. Overall, the wind speed classes and wind directions appear to be represented in each year, although stability class was not considered.

TVA is the major source of SO_2 for the competing sources and the cause of modeled exceedances. Although the level of modeled exceedance might change in considering which years of meteorology to include the TVA sources operating, changing the years is highly unlikely to result in moving the location of modeled exceedances beyond the MS Silicon facility to a location where MS Silicon could contribute.

		2007						2008						2009						2010						2011					
	Wind Classes (m/s)→ Directions↓	0.50 - 2.10	2.10 - 3.60	3.60 - 5.70	5.70 - 8.80	8.80 - 11.10	>= 11.10	0.50 - 2.10	2.10 - 3.60	3.60 - 5.70	5.70 - 8.80	8.80 - 11.10	>= 11.10	0.50 - 2.10	2.10 - 3.60	3.60 - 5.70	5.70 - 8.80	8.80 - 11.10	>= 11.10	0.50 - 2.10	2.10 - 3.60	3.60 - 5.70	5.70 - 8.80	8.80 - 11.10	>= 11.10	0.50 - 2.10	2.10 - 3.60	3.60 - 5.70	5.70 - 8.80	8.80 - 11.10	>= 11.10
1	355 - 5	67	102	95	30	2	0	101	139	84	36	0	0	36	58	63	29	0	0	35	77	88	21	0	0	31	45	96	16	1	0
2	5-15	110	234	136	45	2	0	97	143	106	43	1	0	49	71	81	37	3	0	52	96	129	33	0	0	40	68	116	34	0	0
3	15 - 25	112	191	99	36	0	0	77	117	96	43	1	0	71	109	66	40	2	0	64	116	104	53	0	0	68	67	119	71	1	1
4	25 - 35	53	113	77	12	0	0	77	119	98	33	0	1	114	209	108	45	3	0	112	196	122	42	0	0	146	166	111	58	2	0
5	35 - 45	52	46	46	14	0	0	120	98	63	26	5	1	164	140	102	54	2	0	144	167	100	36	0	0	166	139	99	32	0	0
6	45 - 55	26	42	18	5	0	0	68	53	54	16	0	0	85	89	68	29	1	0	74	107	84	21	0	0	68	75	69	18	2	0
7	55 - 65	15	41	28	3	0	0	30	42	32	5	0	0	55	69	44	20	0	0	45	61	70	13	0	0	38	57	40	6	0	0
8	65 - 75	23	39	23	0	0	0	28	32	16	2	0	0	40	46	30	12	0	0	30	34	31	7	0	0	35	52	29	1	0	0
9	75 - 85	19	37	12	1	0	0	32	45	18	1	0	0	40	56	23	2	0	0	24	30	10	2	0	0	25	37	13	0	0	0
10	85 - 95	26	35	13	1	0	0	22	28	13	5	0	0	35	51	21	1	0	0	16	28	14	2	0	0	24	30	11	0	0	0
11	95 - 105	17	55	15	0	0	0	28	48	16	11	0	0	43	42	19	0	0	0	24	27	9	1	0	0	29	29	13	0	0	0
12	105 - 115	26	51	22	1	0	0	33	38	20	12	0	0	36	49	31	1	0	0	22	20	5	2	0	0	26	33	12	0	0	0
13	115 - 125	38	59	50	1	0	0	22	46	42	11	0	0	33	20	17	3	0	0	22	24	3	1	0	0	33	42	16	1	0	0
14	125 - 135	43	80	44	3	0	0	19	48	45	9	0	0	34	36	13	2	0	0	17	32	10	0	0	0	24	45	18	1	0	0
15	135 - 145	39	84	54	11	0	0	33	70	65	6	0	0	28	59	22	4	1	0	30	37	13	0	0	0	27	50	19	1	0	0
16	145 - 155	39	109	100	28	3	0	35	96	99	37	2	0	31	64	31	12	0	0	36	51	20	6	0	0	41	58	15	5	0	0
17	155 - 165	55	159	154	38	2	1	42	110	134	73	22	0	47	82	50	17	1	2	49	71	39	13	0	0	42	63	25	6	0	0
18	165 - 175	76	189	172	68	0	4	70	156	170	130	19	1	42	102	67	11	3	0	50	87	93	32	1	0	35	87	56	12	0	0
19	175 - 185	107	262	185	70	6	0	62	129	154	102	5	0	67	132	87	28	0	0	63	121	115	36	3	0	58	109	111	25	0	0
20	185 - 195	102	156	88	39	0	0	84	96	92	84	3	0	58	156	143	66	5	0	69	137	125	60	2	1	63	148	152	63	2	0
21	195 - 205	92	124	65	14	0	0	72	100	76	40	4	0	72	211	192	84	8	0	112	225	127	65	4	1	86	223	235	122	6	0
22	205 - 215	86	74	40	9	0	0	74	76	41	16	0	0	102	239	129	51	3	0	101	203	94	49	7	0	118	263	169	77	17	3
23	215 - 225	73	81	41	7	0	0	77	70	41	6	0	0	77	130	81	20	0	0	102	99	42	18	1	0	99	145	97	57	4	0
24	225 - 235	97	75	24	9	0	0	71	69	43	7	0	0	67	96	50	12	0	0	63	70	34	17	0	0	88	78	61	22	1	0
25	235 - 245	99	92	55	5	0	0	71	56	53	13	2	0	69	91	35	9	2	0	60	67	27	4	3	0	63	67	61	12	1	0
26	245 - 255	84	81	56	18	0	0	54	62	38	14	0	0	58	59	36	10	0	0	58	62	21	2	0	0	53	60	50	8	1	0
27	255 - 265	51	39	44	7	3	0	55	55	26	17	0	0	72	59	42	20	1	0	53	60	30	10	0	0	67	62	59	13	0	0
28	265 - 275	46	58	31	8	1	0	63	52	30	14	0	0	56	64	33	27	2	0	70	63	34	9	1	0	59	58	45	11	0	0
29	275 - 285	27	43	19	3	1	0	38	53	55	7	0	0	57	50	23	13	3	0	59	37	19	14	1	0	53	40	30	9	0	0
30	285 - 295	43	48	27	2	0	0	29	71	43	9	0	0	56	63	26	7	3	0	65	52	24	5	0	0	53	57	24	10	0	0
31	295 - 305	29	57	30	11	0	0	28	72	39	7	0	0	47	49	16	2	0	0	54	60	22	4	0	0	54	55	34	4	0	0
32	305 - 315	27	49	44	14	0	0	36	80	42	5	1	0	46	68	21	4	0	0	43	39	22	2	0	0	50	62	29	1	0	0
33	315 - 325	29	36	51	30	0	0	35	55	55	20	1	0	44	65	44	6	0	0	54	48	39	4	0	0	47	79	43	5	0	0
34	325 - 335	31	41	59	23	0	0	44	68	63	29	0	0	34	79	55	8	0	0	48	82	45	9	0	0	43	57	44	1	0	0
35	335 - 345	27	48	70	28	3	0	50	80	64	20	0	0	32	51	46	6	0	0	40	80	58	9	0	0	26	64	61	7	0	0
36	345 - 355	55	85	99	35	2	0	60	82	75	27	0	0	32	52	45	16	0	0	55	75	96	24	0	0	30	47	71	10	0	0



2007



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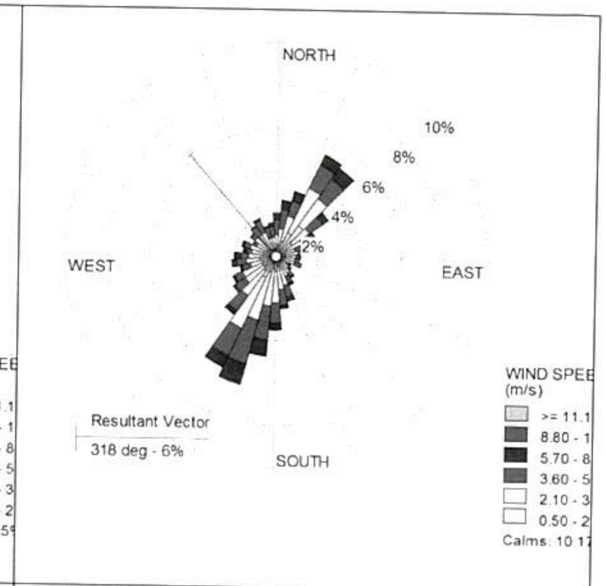

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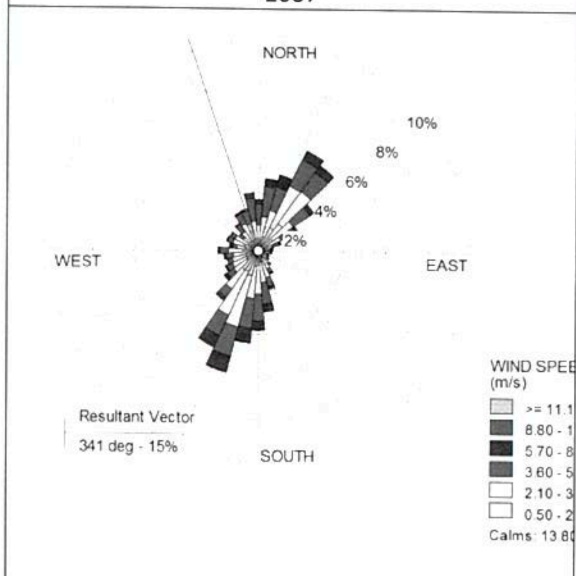
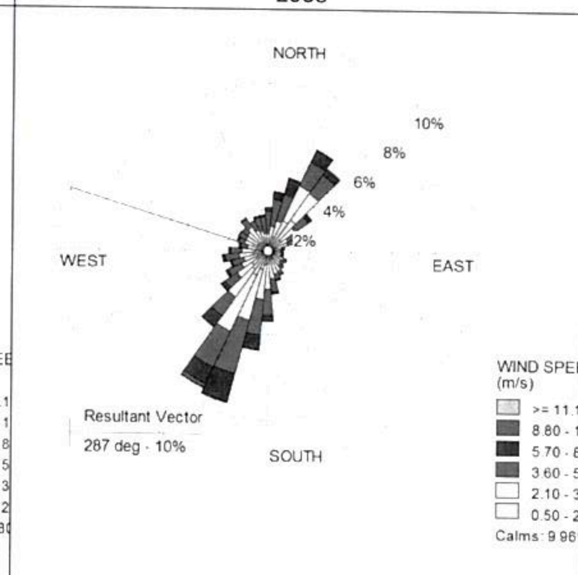


2010



2011

Attachement 2 – 20D Screening for MS Sources

Cnty code	Plant id	name	Utm zone	Utm horz	Utm vert	Distance (km)	NOX (TPY)	>20D (Y/N)	Within SIA (Y/N)	SO2 (TPY)	>20D (Y/N)	Within SIA (Y/N)
093	00009	ACME BRICK COMPANY	16	275.693	3851.71	103.2949383	45.99	N	N	88.04	N	N
081	00135	ADVANCED INNOVATIONS EAST LLC	16	347.502	3816.62	47.37006751	4.47	N	N	0.15	N	N
057	00014	ATLAS MANUFACTURING COMPANY	16	383.47	3787.36	64.81209396	0.09	N	N	0.0004	N	N
081	00132	AUTO PARTS MANUFACTURING MISSISSIPPI INC	16	346.84	3815.18	48.88588376	129.2	N	N	1.2	N	N
141	00052	BAYMONT INC	16	391.108	3816.81	37.23104469	0	N	N	0	N	N
141	00042	BELMONT FIBERGLASS INC	16	389.496	3816.43	37.1040925	1.41	N	N	0.01	N	N
115	00035	BEST FOAM INC	16	331	3803.01	68.58847127	0.32	N	N	0	N	N
057	00022	BIG BEE METAL MANUFACTURING COMPANY INC	16	384.049	3788.67	63.54181076	0.21	N	N	1.95	N	N
139	00046	BILTRITE RIPLEY OPERATIONS LLC	16	323.532	3850.85	55.46758705	25.61	N	N	0.15	N	N
139	00003	BLUE MOUNTAIN PRODUCTION COMPANY, TAYLOR	16	314.455	3835.71	66.55873422	65.7	N	N	249	N	N
081	00013	BONDS PAVING MATERIALS INC	16	347.77	3792.36	67.32313332	46.98	N	N	4.77	N	N
145	00037	BTEC NEW ALBANY LLC	16	322.121	3823.79	63.48488723	246.05	N	N	3.06	N	N
057	00016	C AND W CUSTOM TRAILERS	16	379.6	3804.81	47.20487387	0.15	N	N		N	N
081	00024	CARPENTER COMPANY	16	342.885	3781.78	78.96511193	7.1	N	N	0.06	N	N
003	00003	CATERPILLAR INC	16	360.248	3864.49	22.51436868	62.99	N	N	2.67	N	Y
117	00048	CATERPILLAR REMANUFACTURED COMPONENTS GR	16	359.9	3838.33	23.48228278	9.68	N	N	0.12	N	N
003	00028	COLUMBIA GULF TRANSMISSION, CORINTH COMP	16	370.24	3869.24	19.32521738	5304.7	Y	N	1.97	N	Y
141	00051	COMPOSITE BUILDING SYSTEMS INC	16	383.995	3835.51	17.24971895	0.16	N	N	0	N	Y
081	00071	CONFORTAIRE INC	16	344.558	3788.44	72.29469314	0.24	N	N	0	N	N
081	00008	COOPER TIRE COMPANY, THE	16	342.444	3789.03	72.81497893	221.79	N	N	188.52	N	N
115	00048	CUSHIONS TO GO	16	314.12	3794.7	86.56156739	1.03	N	N	0.01	N	N
115	00008	EATON CUSTOM SEATING LLC	16	314.79	3791.05	88.53338336	1.614	N	N	0.0106	N	N
141	00033	ERGON ASPHALT AND EMULSIONS INC, YELLOW	16	386.876	3870.87	20.44338045	9.4	N	N	33.4	N	Y
141	00056	ERSHIGS INC. ERSHIGS IUKA FRP FACILITY	16	389.72	3869.08	20.16285523	3.6	N	N	0.3	N	Y
139	00063	FIVE STAR MARINE INC	16	324.185	3849.15	54.87733283	0.03	N	N	0	N	N
081	00046	FLEXIBLE FOAM PRODUCTS INC	16	344.8	3789.15	71.56050963	6.02	N	N	0.04	N	N
081	00099	FMC TECHNOLOGIES INC	16	343.561	3802.29	61.0483946	14.9	N	N	0.09	N	N
081	00072	FOAM CRAFT	16	337.908	3791.67	73.00104771	2.35	N	N	0.01	N	N
081	00022	FXI INC	16	342.607	3781.97	78.92482735	7.71	N	N	0.05	N	N

Cnty code	Plant id	name	Utm zone	Utm horz	Utm vert	Distance (km)	NOX (TPY)	>20D (Y/N)	Within SIA (Y/N)	SO2 (TPY)	>20D (Y/N)	Within SIA (Y/N)
117	00004	GENERAL BINDING CORPORATION	16	357.173	3838.13	25.85690542	24	N	N	0.16	N	N
139	00005	HANKINS INC	16	330.838	3843.04	48.97770429	93.3	N	N	91.6	N	N
057	00021	HICKORY HILL FURNITURE CORPORATION	16	369.394	3791.08	61.67954359	0.91	N	N	0.01	N	N
081	00102	HICKORY SPRINGS MANUFACTURING COMPANY, V	16	342.698	3781.29	79.48641788	10.21	N	N	0.07	N	N
057	00007	HOMAN INDUSTRIES	16	370.723	3789.12	63.42862072	61.6	N	N	3.14	N	N
081	00025	HOME DECOR INNOVATIONS, A DIV OF RENIN	16	344.132	3788.97	72.03338666	0.54	N	N	0	N	N
081	00037	HUNTER DOUGLAS INC, TUPELO CENTER	16	343.112	3781.53	79.08519333	13.85	N	N	0.08	N	N
115	00051	IDEAL FOAM LLC, PONTOTOC FACILITY	16	314.804	3793.08	87.13489835	5.74	N	N	0.05	N	N
139	00065	IDEAL FOAM LLC, RIPLEY FACILITY	16	324.8	3849.35	54.25279297		N	N		N	N
081	00088	INDEPENDENT FURNITURE SUPPLY COMPANY	16	337.571	3794.38	70.96690307	2.06	N	N	0.01	N	N
141	00011	INTERNATIONAL CONVERTER	16	390.163	3853.08	11.22680714	15.32	N	N	0.12	N	Y
003	00030	KIMBERLY CLARK CORPORATION, CORINTH MILL	16	367.862	3867.98	19.46496156	60.13	N	N	1.72	N	Y
003	00051	KINGSFORD MANUFACTURING COMPANY	16	368.94	3859.96	12.80862916	328.48	Y	Y	75.17	N	Y
071	00009	LEHMAN ROBERTS COMPANY, PLANT NUMBER 11	16	269.281	3808.64	117.9684327	10.85	N	N		N	N
117	00051	MARIETTA WOOD SUPPLY INC	16	365.05	3819.71	35.18232314	0.27	N	N		N	N
145	00008	MASTER BILT PRODUCTS	16	317.38	3823.94	67.70042248	2.23	N	N	0.02	N	N
141	00058	METAL EXPORTS LLC	16	390.093	3868.4	19.79485801	13.69	N	Y	95	N	Y
003	00019	MISSISSIPPI POLYMERS INC	16	360.262	3863.78	22.11740501	12.23	N	N	0.18	N	Y
057	00028	MUELLER CASTING COMPANY INC	16	370.103	3790.55	62.10072054	82.43	N	N	28.38	N	N
057	00012	MUELLER COPPER TUBE COMPANY	16	370.231	3790.55	62.08451736	48.19	N	N	11.15	N	N
081	00058	NORBORD INDUSTRIES INC	16	348.311	3814.64	48.35370002	292.82	N	N	50.29	N	N
145	00043	NORTH MISSISSIPPI BIODIESEL INC	16	317.328	3822.59	68.32027394	5.47	N	N	9.7	N	N
081	00026	NORTH MISSISSIPPI MEDICAL CENTER	16	341.924	3790.09	72.16836165	153.42	N	N	234.04	N	N
139	00055	NORTHEAST MISSISSIPPI SOLID WASTE MANAGE	16	323.064	3868.74	58.37180126	22.65	N	N	7.66	N	N
139	00014	OIL DRI PRODUCTION COMPANY	16	322.367	3847.18	56.82646927	283.64	N	N	278.5	N	N
071	00029	OLIN CORPORATION	16	268.314	3809.87	118.4264168	45.67	N	N	3.16	N	N
115	00002	PASLODE	16	314.428	3793.43	87.17933654	1.6	N	N	0.01	N	N
081	00118	PREGIS INNOVATIVE PACKAGING	16	344.794	3788.81	71.86135837	8.81	N	N	0.05	N	N
115	00024	PREMIERE PLASTICS INC	16	317.842	3791.42	86.08363891	2.15	N	N	0.01	N	N

Cnty code	Plant id	name	Utm zone	Utm horz	Utm vert	Distance (km)	NOX (TPY)	>20D (Y/N)	Within SIA (Y/N)	SO2 (TPY)	>20D (Y/N)	Within SIA (Y/N)
139	00020	PROFILE PRODUCTS LLC	16	316.4	3840.05	63.71996833	47.76	N	N	137.79	N	N
139	00001	ROGERS GROUP INC, RIPLEY ASPHALT	16	325.558	3845.08	53.87690716	99	N	N	99	N	N
093	00030	ROURA IRON WORKS, INC	16	276.82	3847.86	102.251828	0.58	N	N	0.004	N	N
093	00052	ROXUL USA INC	16	261.224	3873.26	119.6650479	403.13	N	N	1035.39	N	N
081	00027	SUNSHINE MILLS INC	16	341.641	3786.95	75.01874362	22.59	N	N	0.14	N	N
081	00049	TEGRANT DIVERSIFIED BRANDS INC	16	341.197	3787.94	74.38377402	15.41	N	N	55.2	N	N
145	00019	TENNESSEE GAS PIPELINE COMPANY, NEW ALBA	16	314.949	3823.5	70.09972878	1903.68	Y	N	0.32	N	N
115	00042	THREE RIVERS SOLID WASTE MANAGEMENT AUTH	16	310.478	3795.51	88.8038811	64.33	N	N	30.36	N	N
141	00053	TIFFIN MOTORHOMES INC, PAINT FACILITY	16	389.317	3816.43	37.05091332	351.39	N	N	2.71	N	N
003	00052	TIMBER PRODUCTS COMPANY	16	360.643	3863.78	21.79307822	7.02	N	N	0.13	N	Y
141	00002	TISHOMINGO ACQUISITION LLC, DBA TBEI	16	387.099	3835.34	18.53776307	3.3	N	N	0.02	N	N
057	00031	TOPLINE MANUFACTURING COMPANY INC	16	384.039	3787.84	64.36941866	0.03	N	N		N	N
057	00034	TOYOTA BOSHOKU AMERICA	16	359.649	3792.98	62.11877977	99	N	N	0.01	N	N
145	00045	TOYOTA MOTOR MANUFACTURING MISSISSIPPI I	16	325.754	3805.38	70.76764683	448	N	N	5.5	N	N
009	00019	TVA MAGNOLIA COMBINED CYCLE	16	299.078	3855.86	80.00195613	1009.19	N	N	71.14	N	N
071	00021	UNIVERSITY OF MISSISSIPPI, THE	16	266.857	3804.72	121.6938557	249	N	N	249	N	N
093	00001	VALERO MKS LOGISTICS LLC, COLLIERVILLE T	16	258.668	3873.51	122.2253508	94.92	N	N	22.59	N	N
145	00048	VUTEQ, MARTINTOWN SITE	16	311.04	3818.15	75.91676748	1.56	N	N	0.03	N	N
141	00044	WATER WAY INC	16	389.944	3868.74	19.99601877	1.45	N	Y	0.01	N	Y
141	00057	WATER WAY INC, PAUL EDMONDSON ROAD FACIL	16	389.655	3853.15	10.72825169	0.08	N	N	0	N	N
141	00041	YELLOW CREEK COATING SERVICES	16	386.85	3870.84	20.40475222		N	N		N	N

SIGNIFICANT IMPACT ANALYSIS

NO2_SIA_Grid2 – NO2 significant impact directory (Application receptor grid augmented with 1km spacing in complex terrain areas)

NO2_SIA_Grid2.ADI – AERMOD Input File

NO2_SIA_Grid2.ADO – AERMOD Output File

NO2_SIA_Grid2.AD – Plot File Directory

01H1G001.PLT – 5-yr Avg of 1st High Impact for Source Group 1

01H1G002.PLT – 5-yr Avg of 1st High Impact for Source Group 2

01H1G003.PLT – 5-yr Avg of 1st High Impact for Source Group 3

01H1G004.PLT – 5-yr Avg of 1st High Impact for Source Group 4

01H8G001.PLT – 5-yr Avg of 8th High Impact for Source Group 1

01H8G002.PLT – 5-yr Avg of 8th High Impact for Source Group 2

01H8G003.PLT – 5-yr Avg of 8th High Impact for Source Group 3

01H8G004.PLT – 5-yr Avg of 8th High Impact for Source Group 4

AN00G001.PLT – 5-yr Avg of Annual Impact for Source Group 1

AN00G002.PLT – 5-yr Avg of Annual Impact for Source Group 2

AN00G003.PLT – 5-yr Avg of Annual Impact for Source Group 3

AN00G004.PLT – 5-yr Avg of Annual Impact for Source Group 4

SO2_SIA_Grid2 – SO2 significant impact directory (Application receptor grid augmented with 1km spacing in complex terrain areas)

SO2_SIA_Grid2.ADI – AERMOD Input File

SO2_SIA_Grid2.ADO – AERMOD Output File

SO2_SIA_Grid2.AD – Plot File Directory

01H1G001.PLT – 5-yr Avg of 1st High Impact for Source Group 1

01H1G002.PLT – 5-yr Avg of 1st High Impact for Source Group 2

01H1G003.PLT – 5-yr Avg of 1st High Impact for Source Group 3

01H1G004.PLT – 5-yr Avg of 1st High Impact for Source Group 4

01H4G001.PLT – 5-yr Avg of 4th High Impact for Source Group 1

01H4G002.PLT – 5-yr Avg of 4th High Impact for Source Group 2

01H4G003.PLT – 5-yr Avg of 4th High Impact for Source Group 3

01H4G004.PLT – 5-yr Avg of 4th High Impact for Source Group 4

AN00G001.PLT – 5-yr Avg of Annual Impact for Source Group 1

AN00G002.PLT – 5-yr Avg of Annual Impact for Source Group 2

AN00G003.PLT – 5-yr Avg of Annual Impact for Source Group 3

AN00G004.PLT – 5-yr Avg of Annual Impact for Source Group 4

NO2_SIA_FineGrid – Directory for NO2 Significance Analysis on NO2 Cumulative Refined Receptor Network. This receptor network contained only those receptors with an exceedance of the standard from initial cumulative analysis run plus added extended 100-meter grid around the receptor. The significance analysis was rerun after adding additional 100-m spaced receptors.

NO2_SIA_FineGrid.ADI – AERMOD Input File

NO2_SIA_FineGrid.ADO – AERMOD Output File

NO2_SIA_FineGrid.AD – Plot File Directory

01H1GALL.PLT - 5-yr Avg of 1st High Impact

01H8GALL.PLT - 5-yr Avg of 8th High Impact

AN00GALL.PLT - 5-yr Avg of Annual Impact

SO2_SIA_FineGrid – Directory for SO2 Significance Analysis on SO2 Cumulative Refined Receptor Network. This receptor network contained only those receptors with an exceedance of the standard from initial cumulative analysis run plus added extended 100-meter grid around the receptor. The significance analysis was rerun after adding additional 100-m spaced receptors.

SO2_SIA_FineGrid.ADI – AERMOD Input File

SO2_SIA_FineGrid.ADO – AERMOD Output File

SO2_SIA_FineGrid.AD – Plot File Directory

01H1G001.PLT – 5-yr Avg of 1st High Impact for Source Group 1

01H1G002.PLT – 5-yr Avg of 1st High Impact for Source Group 2

01H1G003.PLT – 5-yr Avg of 1st High Impact for Source Group 3

01H1G004.PLT – 5-yr Avg of 1st High Impact for Source Group 4

01H4G001.PLT – 5-yr Avg of 4th High Impact for Source Group 1

01H4G002.PLT – 5-yr Avg of 4th High Impact for Source Group 2

01H4G003.PLT – 5-yr Avg of 4th High Impact for Source Group 3

01H4G004.PLT – 5-yr Avg of 4th High Impact for Source Group 4

AN00G001.PLT – 5-yr Avg of Annual Impact for Source Group 1

AN00G002.PLT – 5-yr Avg of Annual Impact for Source Group 2

AN00G003.PLT – 5-yr Avg of Annual Impact for Source Group 3

AN00G004.PLT – 5-yr Avg of Annual Impact for Source Group 4

CUMULATIVE IMPACT ANALYSIS

\CIA\NO2_Culpability – Directory contains the full impact analysis

\CIA\NO2_Culpability\NO2_20XX – individual year runs with initial receptor grid

NO2_20XX.ADI – AERMOD Input file

NO2_20XX.ADO – AERMOD Output file

NO2_Process.accdb – Access database used to merge individual years into a 5-yr average

Query1 – Determines receptors with a 5-yr average H8H above NAAQS

Query2 – Determines 5-year average for each modeled exceedance of the NAAQS and each source groups contribution to the exceedance.

Query3 – Determines each source groups maximum contribution to an exceedance by receptor

NO2_20XX.AD – Plot file and MAXDCONT file directory

01H8G001.PLT – Plot file for cumulative design value

20XXExceedance.dat – MAXDCONT file

\CIA\NO2_Culpability\Refined – Directory contains the full impact analysis with receptors at 100-m spacing surrounding the previously identified receptors with exceedances

NO2_Refined.accdb – Access database used to merge individual years into a 5-yr average.

"5yr_avg_Exceedance Table" – Contains the merged 5yr values

Form1 - contains button with the code used to average the individual years into a 5yr average.

"FineMaxImpacts" Query – Contains maximum impacts and contribution to impacts at each receptor.

NO2_20XX.ADI – AERMOD Input file

NO2_20XX.ADO – AERMOD Output file

NO2_20XX.AD – Plot file and MAXDCONT file directory

01H8G001.PLT – Plot file for cumulative design value

20XXExceedance.dat – MAXDCONT file

\CIA\SO2_20XX – directories for initial runs of SO2 by individual year to determine areas with NAAQS Exceedance

\CIA\SO2_Culpability\SO2_20XX – directories for individual years run with only exceedance receptors from initial runs

\CIA\SO2_Culpability\Refined Grid\20XX – directories for individual years with 100-m spacing added around receptors modeled greater than NAAQS for 5-yr average

Refined Exceedance.accdb – Access database used to average individual years to 5-yr average